Kawasaki

Ninja 300
Ninja 300 ABS

Motorcycle Service Manual

Quick Reference Guide

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This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

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The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your Motorcycle dealer for the latest information on product improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

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LIST OF ABBREVIATIONS

A	ampere(s)	in.	inch(s)
ABDC	after bottom dead center	km/h	kilometers per hour
ABS	antilock brake system	L	liter(s)
AC	alternating current	LCD	liquid crystal display
Ah	ampere hour	LED	light emitting diode
ATDC	after top dead center	lb	pound(s)
BBDC	before bottom dead center	m	meter(s)
BDC	bottom dead center	min	minute(s)
BTDC	before top dead center	mmHg	millimeters of mercury
°C	degree(s) Celsius	mph	miles per hour
cmHg	centimeters of mercury	N	newton(s)
cu in	cubic inch(s)	oz	ounce(s)
DC	direct current	Pa	pascal(s)
DFI	digital fuel injection	PS	horsepower
DOHC	double overhead camshaft	psi	pound(s) per square inch
DOT	department of transportation	qt	quart(s)
ECU	electronic control unit	r	revolution
F	farad(s)	rpm	revolution(s) per minute
°F	degree(s) Fahrenheit	s	second(s)
ft	foot, feet	TDC	top dead center
g	gram(s)	TIR	total indicator reading
gal	gallon(s)	V	volt(s)
h	hour(s)	W	watt(s)
HP	horsepower(s)	Ω	ohm(s)
IC	integrated circuit		

COUNTRY AND AREA CODES

AT	Austria	CH	Switzerland
AU	Australia	DE	Germany
BR	Brazil	EUR	Europe
CA	Canada	IN	India
CAL	California	US	United States
CO	Colombia	WVTA (FULL AB-2)	WVTA Model (Full Power)

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the fuel injection system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel, ignition, and exhaust systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The exhaust system of this model motorcycle manufactured primarily for sale in California includes a catalytic converter system.

3. Evaporative Emission Control System

Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions".

"Sec. 203(a) The following acts and the causing thereof are prohibited.

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

NOTE

○ *The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows.*

1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*
2. *Tampering could include.*
   - *a. Maladjustment of vehicle components such that the emission standards are exceeded.*
   - *b. Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.*
   - *c. Addition of components or accessories that result in the vehicle exceeding the standards.*
   - *d. Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10 000 PER VIOLATION.

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof. (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below.

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air intake system by cutting, drilling, or other means if such modifications result in increased noise levels.

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle.

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Motorcycle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki motorcycles are introduced by the Service Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want stick coil information, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Stick Coil section.

Whenever you see symbols, heed their instructions! Always follow safe operating and maintenance practices.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

This manual contains four more symbols which will help you distinguish different types of information.

NOTE

○ *This note symbol indicates points of particular interest for more efficient and convenient operation.*

- Indicates a procedural step or work to be done.

○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

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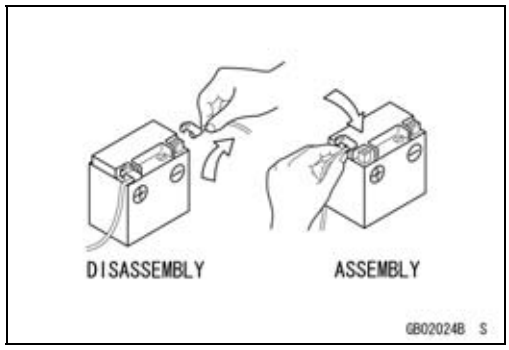
Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a motorcycle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following.

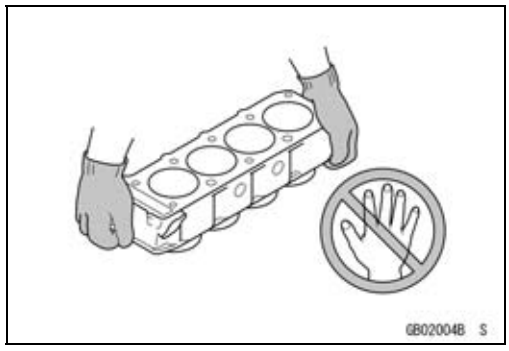
Battery Ground

Before completing any service on the motorcycle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over. Disconnect the ground cable (–) first and then the positive (+). When completed with the service, first connect the positive (+) cable to the positive (+) terminal of the battery then the negative (–) cable to the negative terminal.



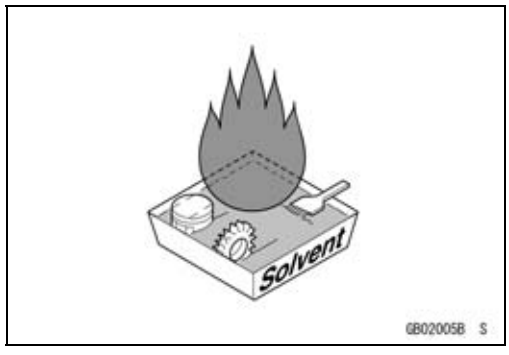
Edges of Parts

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



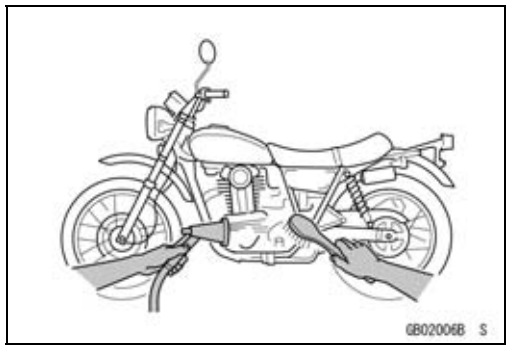
Solvent

Use a high flash-point solvent when cleaning parts. High flash-point solvent should be used according to directions of the solvent manufacturer.



Cleaning Vehicle before Disassembly

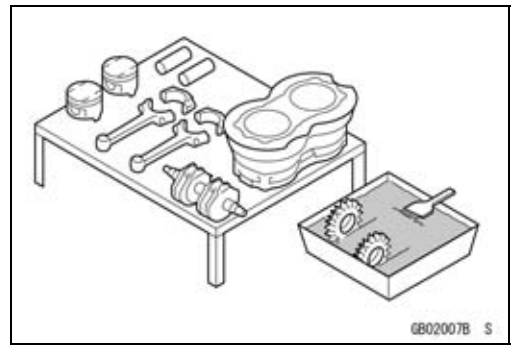
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

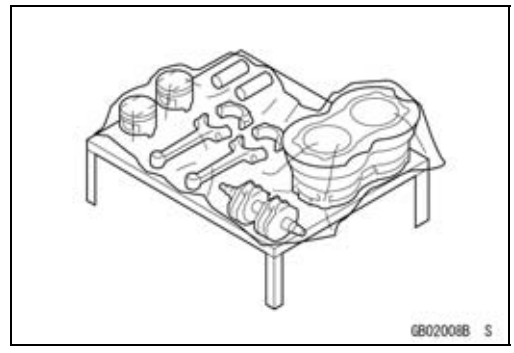
Arrangement and Cleaning of Removed Parts

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



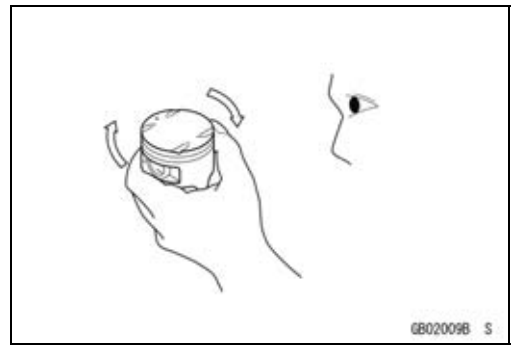
Storage of Removed Parts

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



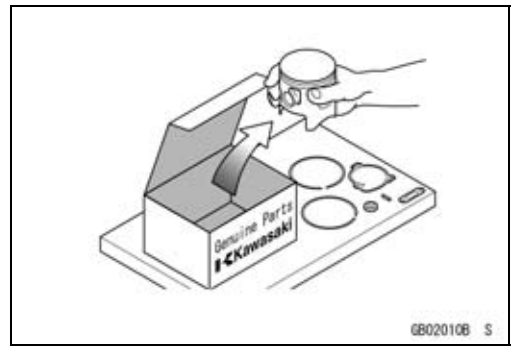
Inspection

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



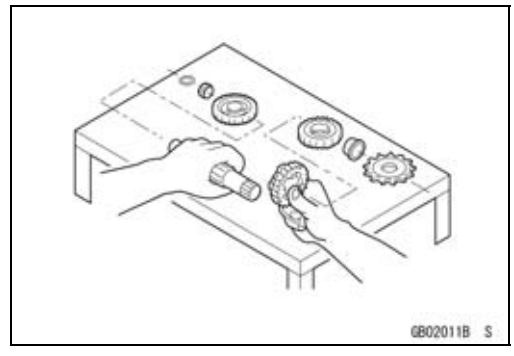
Replacement Parts

Replacement parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips, cotter pins or self-locking nuts must be replaced with new ones whenever disassembled.



Assembly Order

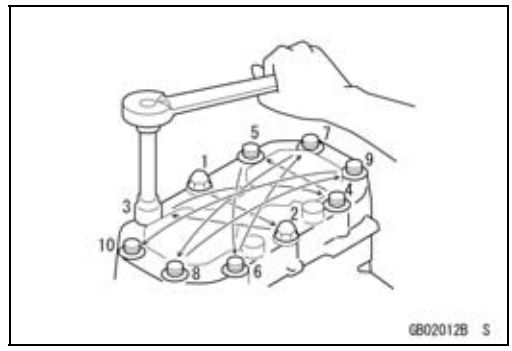
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

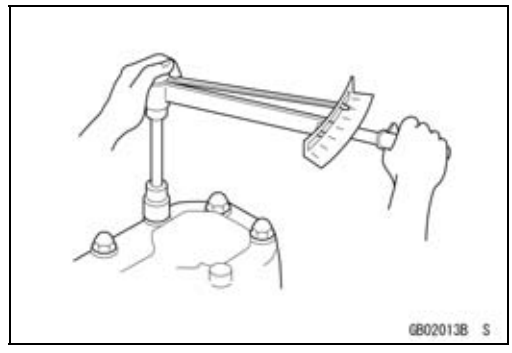
Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



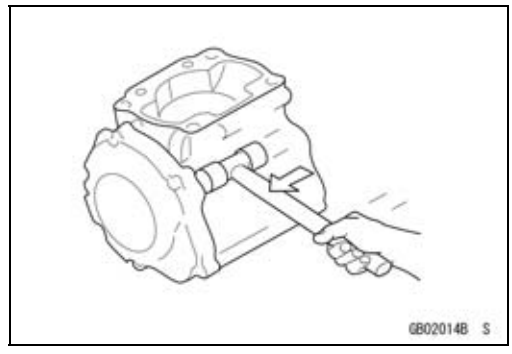
Tightening Torque

Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.



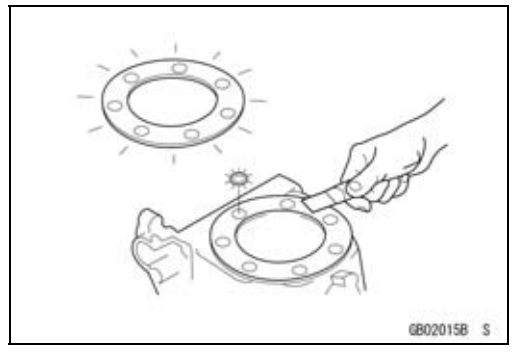
Force

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non-permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



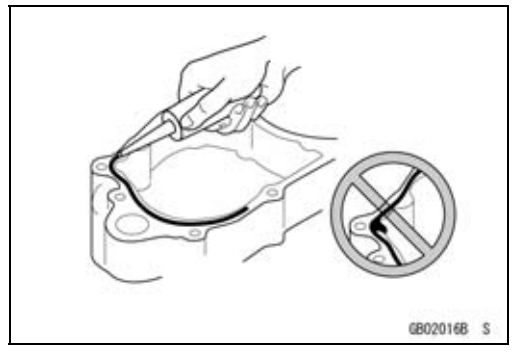
Gasket, O-ring

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install the new gaskets and replace the used O-rings when re-assembling.



Liquid Gasket, Non-permanent Locking Agent

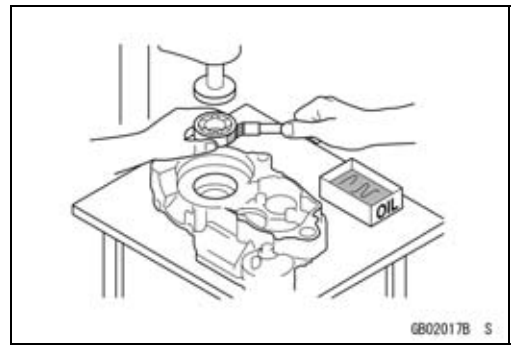
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

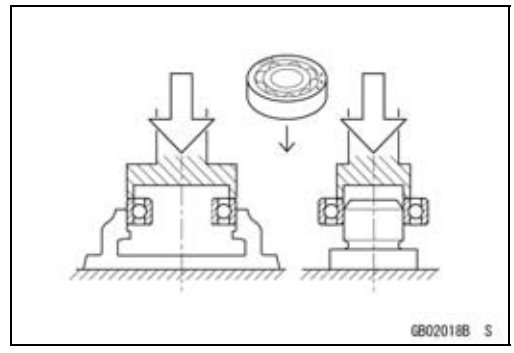
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

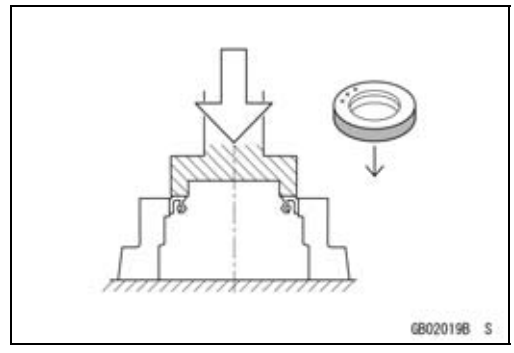
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.

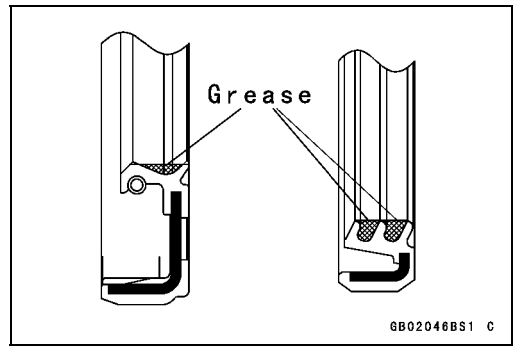


Oil Seal, Grease Seal

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.

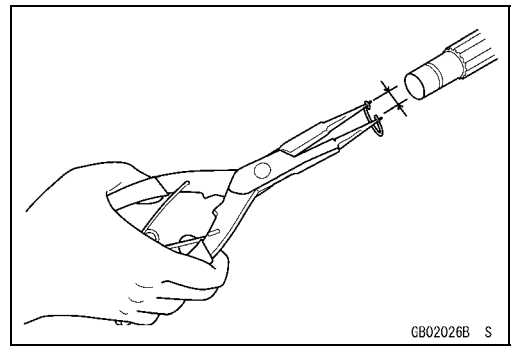


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

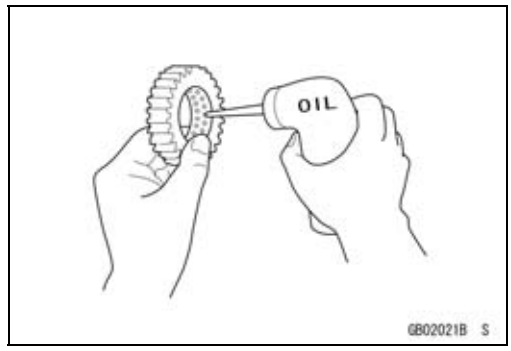
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

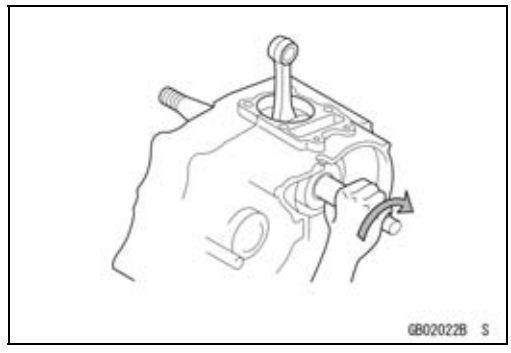
Lubrication

It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



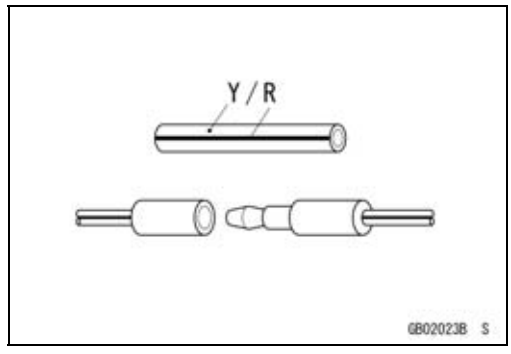
Direction of Engine Rotation

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from output side).



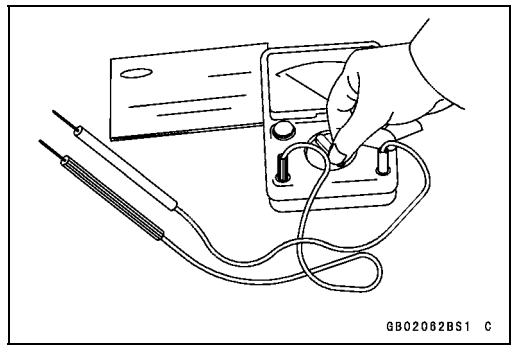
Electrical Wires

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.



Instrument

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.



Model Identification

EX300AD (EUR Models) Left Side View

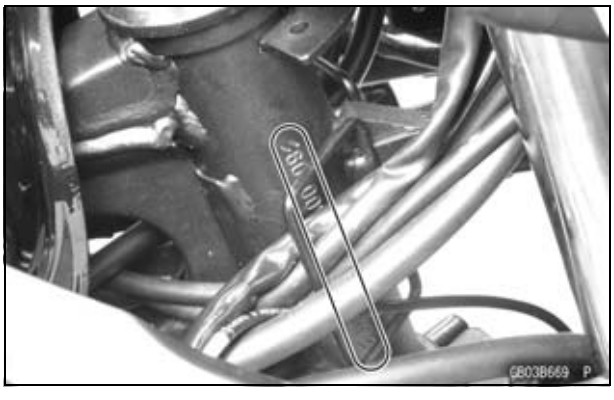
EX300AD (EUR Models) Right Side View

Model Identification

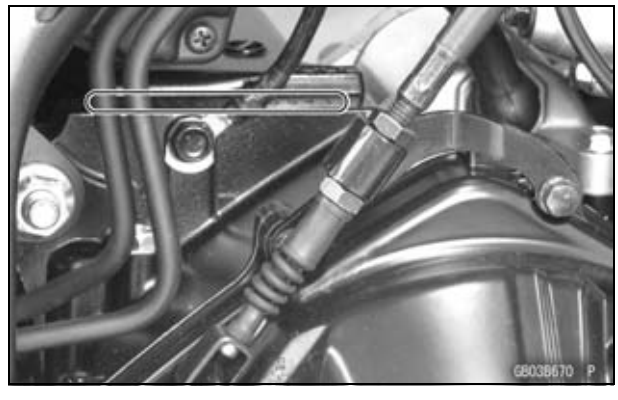
EX300BD (EUR Models) Left Side View

EX300BD (EUR Models) Right Side View

Frame Number



Engine Number



General Specifications

Items	EX300AD/BD
Dimensions	
Overall Length	2 015 mm (79.33 in.)
Overall Width	715 mm (28.15 in.)
Overall Height	1 110 mm (43.70 in.)
Wheelbase	1 405 mm (55.31 in.)
Road Clearance	140 mm (5.51 in.)
Seat Height	785 mm (30.91 in.)
Curb Mass:	
EX300A:	172 kg (379.3 lb) (BR)* 173 kg (381.5 lb)
Front	84 kg (185.2 lb) (BR)* 85 kg (187.4 lb)
Rear	88 kg (194.0 lb)
EX300B:	174 kg (383.7 lb) (BR)* 175 kg (385.9 lb)
Front	85 kg (187.4 lb) (BR)* 86 kg (189.6 lb)
Rear	89 kg (196.2 lb)
Fuel Tank Capacity	17 L (4.5 US gal.)
Performance	
Minimum Turning Radius	2.4 m (7.9 ft)
Engine	
Type	4-stroke, DOHC, 2-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	62.0 × 49.0 mm (2.44 × 1.93 in.)
Displacement	296 cm³ (18.06 cu in.)
Compression Ratio	10.6:1
Maximum Horsepower	29 kW (39 PS) at 11 000 r/min (rpm)
Maximum Torque	27 N·m (2.8 kgf·m, 20 ft·lb) at 10 000 r/min (rpm)
Carburation System	FI (Fuel Injection) 32 × 2
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (digital igniter in ECU)
Ignition Timing	From 10° BTDC at 1 300 r/min (rpm) 31° BTDC at 7 000 r/min (rpm)
Spark Plug	NGK CR8E
Cylinder Numbering Method	Left to right, 1-2
Firing Order	1-2
Valve Timing:	
Intake:	
Open	36° BTDC
Close	56° ABDC
Duration	272°

General Specifications

Items	EX300AD/BD
Exhaust:	
Open	61° BBDC
Close	31° ATDC
Duration	272°
Lubrication System	Forced lubrication (wet sump)
Engine Oil:	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.4 L (2.5 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	3.087 (71/23)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.714 (38/14)
2nd	1.789 (34/19)
3rd	1.409 (31/22)
4th	1.160 (29/25)
5th	1.000 (27/27)
6th	0.857 (24/28)
Final Drive System:	
Type	Chain drive
Reduction Ratio	3.000 (42/14)
Overall Drive Ratio	7.938 at Top gear
Frame	
Type	Tubular, diamond
Caster (Rake Angle)	27°
Trail	93 mm (3.66 in.)
Front Tire:	
Type	Tubeless
Size	110/70-17M/C 54S
Rim Size	J17M/C × MT2.75
Rear Tire:	
Type	Tubeless
Size	140/70-17M/C 66S
Rim Size	J17M/C × MT4.00
Front Suspension:	
Type	Telescopic fork
Wheel Travel	120 mm (4.72 in.)

General Specifications

Items	EX300AD/BD
Rear Suspension:	
Type	Swingarm (uni-trak)
Wheel Travel	132 mm (5.20 in.)
Brake Type:	
Front	Single disc
Rear	Single disc
Electrical Equipment	
Battery	12 V 8 Ah
Headlight:	
Type	Semi-sealed beam
Bulb:	
High	12 V 55 W (quartz-halogen) × 2
Low	12 V 55 W (quartz-halogen)
Tail/Brake Light	12 V 5/21 W
Alternator:	
Type	Three-phase AC
Rated Output	21.0 A/14.0 V at 5 000 r/min (rpm)

Specifications are subject to change without notice, and may not apply to every country.
*: GPS unit equipped models

Technical Information - Assist and Slipper Clutch

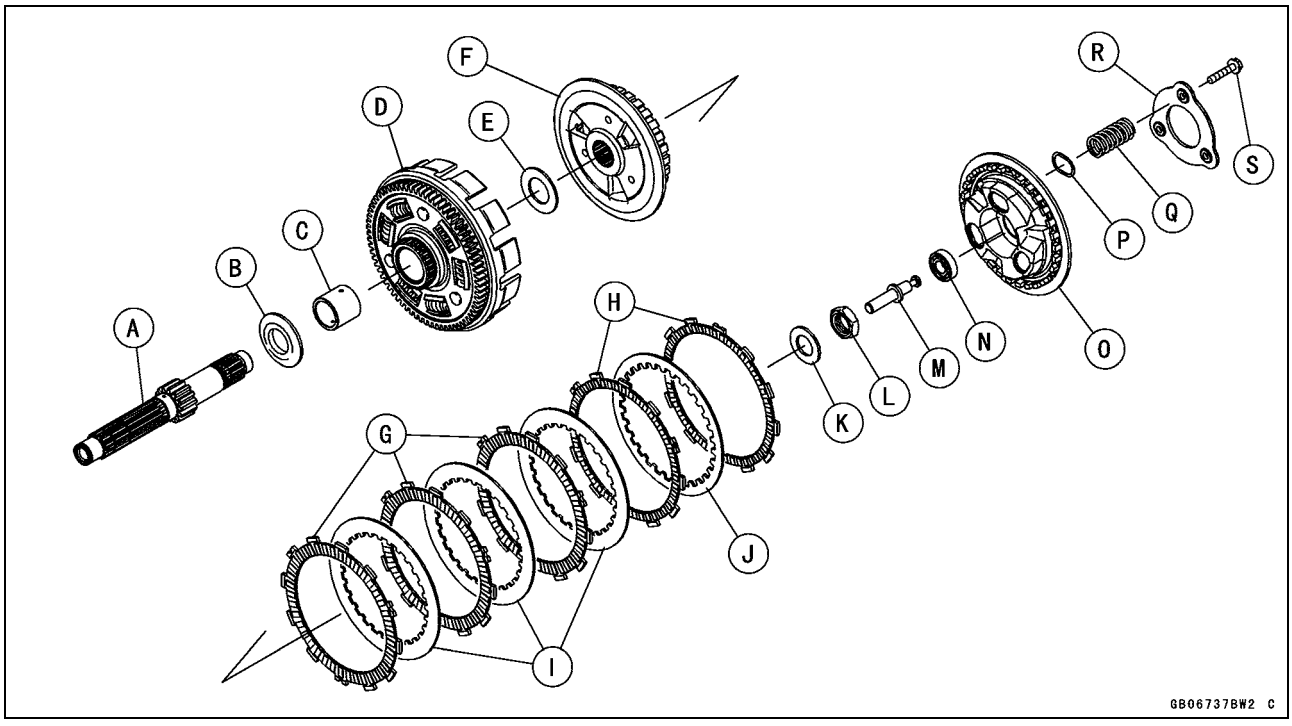
1) Overview

This model has an Assist and Slipper clutch.

The new Assist and Slipper clutch was developed without changing the size and number of parts of the conventional clutch. It also decreases the spring load (clutch lever load) and back-torque (during deceleration).

This clutch has both assist and slipper mechanisms. With the assist mechanism, the clutch lever load is decreased and clutch operation feels lighter. With the slipper mechanism, riding stability can be improved when high back-torque (engine brake) is generated such as during deceleration.

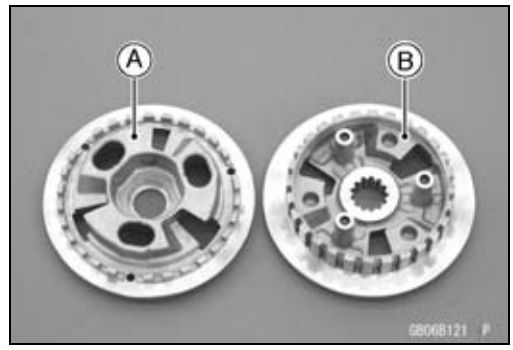
2) Components



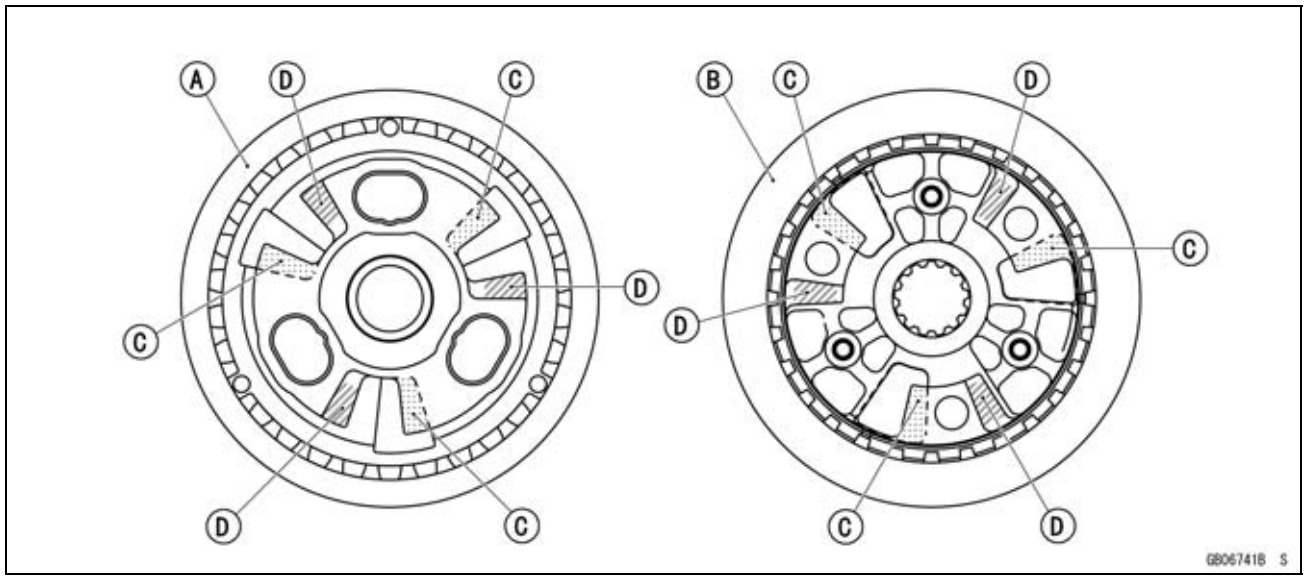
A. Drive Shaft
B. Thrust Spacer
C. Bushing
D. Clutch Housing
E. Spacer
F. Clutch Hub
G. Friction Plates (small ID)
H. Friction Plates (large ID)
I. Steel Plates (small ID)
J. Steel Plates (large ID)
K. Washer
L. Clutch Hub Nut
M. Pusher
N. Bearing
O. Clutch Pressure Plate
P. Spring Seats (3)
Q. Clutch Springs (3)
R. Clutch Stopper Plate
S. Clutch Stopper Bolts (3)

3) New Features

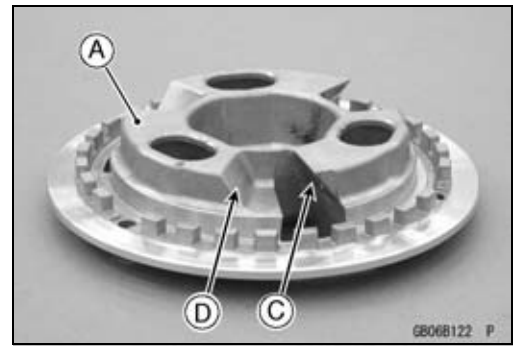
Part of the torque is transmitted via the clutch pressure plate [A]. The cams on the fitting points between the clutch pressure plate and clutch hub [B] generate thrust force when the clutch is engaged (assist force) and slipper force when disengaged, causing the clutch load to be increased or decreased.

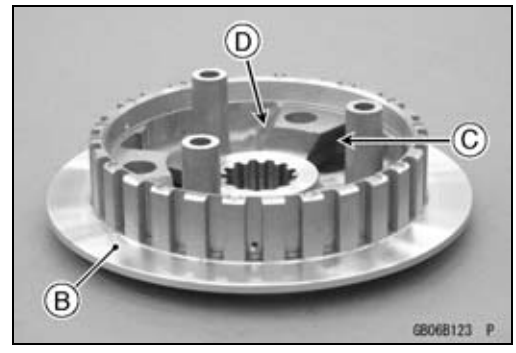


Technical Information - Assist and Slipper Clutch



A. Clutch Pressure Plate
B. Clutch Hub
C. Assist Cams (6 points)
D. Slipper Cams (6 points)

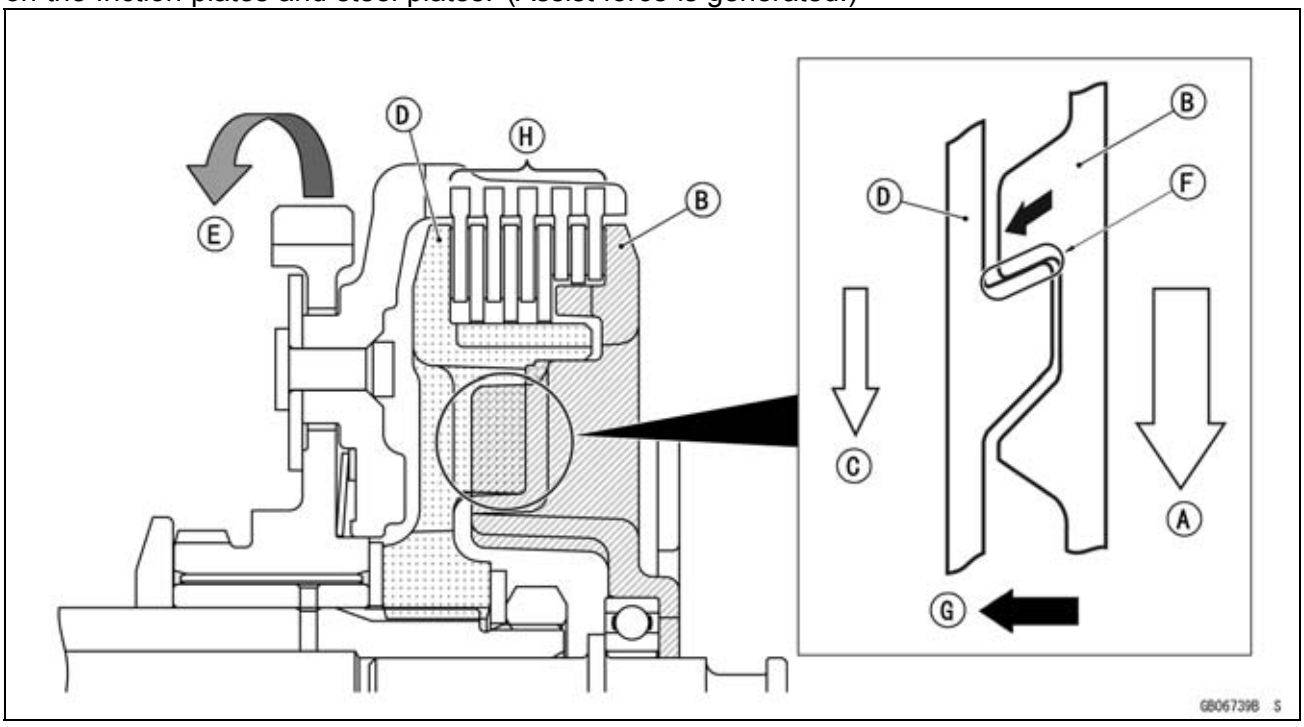




Technical Information - Assist and Slipper Clutch

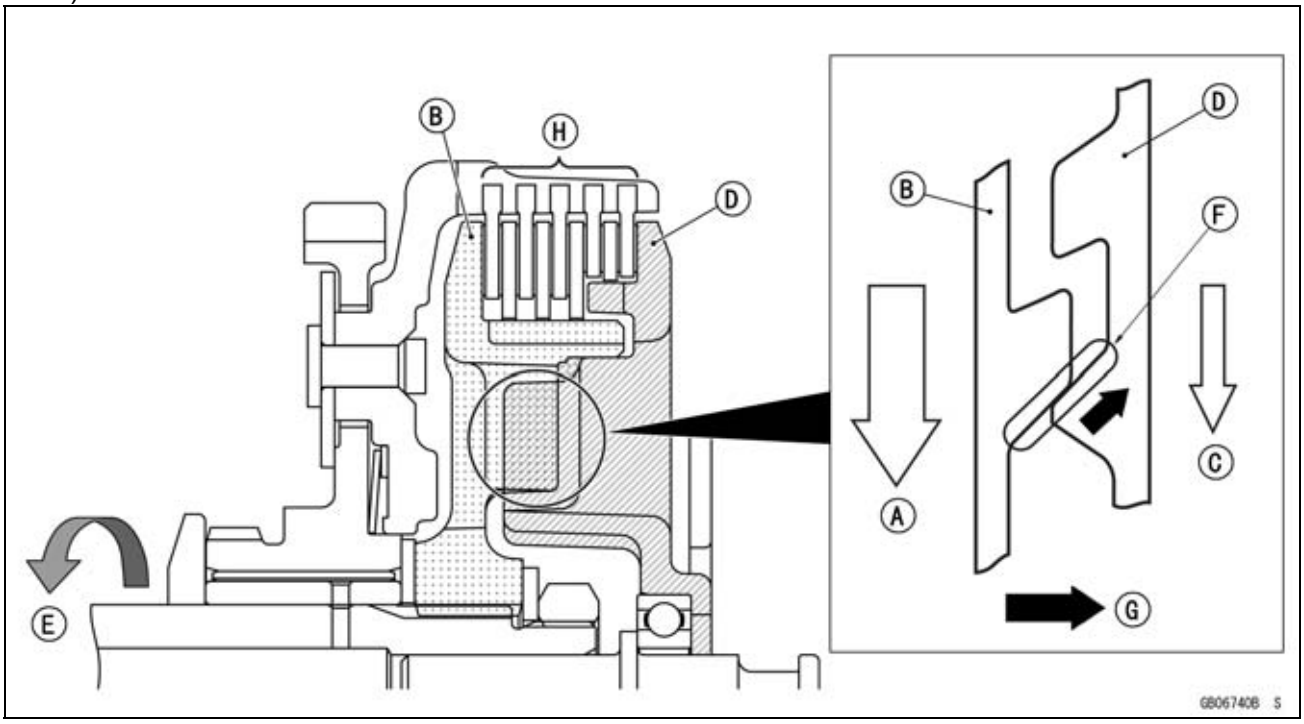
4) Assist Mechanism

When the rotating force [A] of the clutch pressure plate [B] surpasses the rotating force [C] of the clutch hub [D] by the torque [E] generated by the crankshaft during acceleration, the assist cams [F] engage [G] and the clutch pressure plate applies force to the clutch plates [H]. The rotational force from the pressure plate causes it to slide down the cam face of the clutch hub, increasing pressure on the friction plates and steel plates. (Assist force is generated.)



5) Slipper Mechanism

When the rotating force [A] of the clutch hub [B] surpasses the rotating force [C] of the clutch pressure plate [D] by the torque [E] generated by engine braking during deceleration, the slipper cams [F] engage and the clutch pressure plate is separated [G] from the clutch plates [H]. As a result, pressure on the friction plates and the steel plates decreases to disengage the clutch. (Slipper force is generated.)



Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (IMP)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (IMP)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (IMP)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (IMP)
mL	×	0.06102	=	cu in.

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in.

Units of Torque:

N·m	×	0.1020	=	kgf·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kgf·m	×	9.807	=	N·m
kgf·m	×	7.233	=	ft·lb
kgf·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

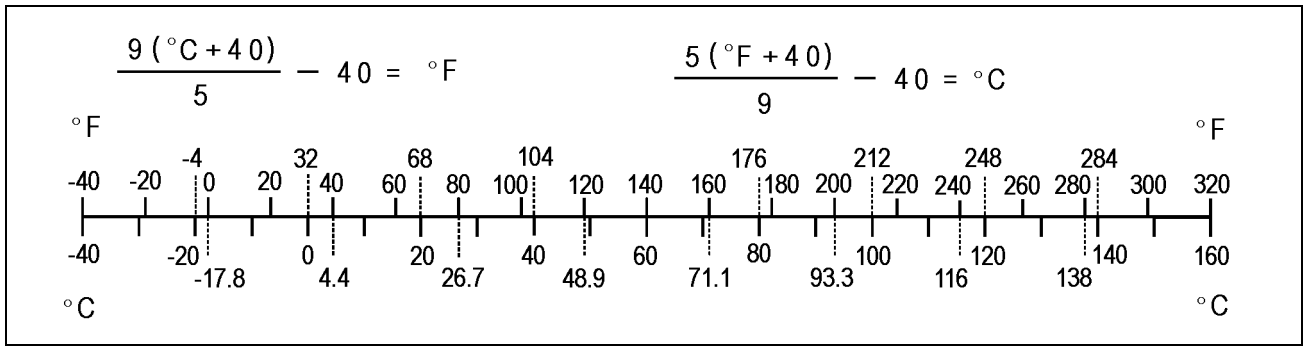
Units of Speed:

km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:



Periodic Maintenance

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Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition.**The initial maintenance is vitally important and must not be neglected.**

Periodic Inspection

*A: Service at number of years shown or indicated odometer reading intervals, whichever comes first.
*B: For higher odometer readings, repeat at the frequency interval established here.
*C: Service more frequently when operating in severe conditions: dusty, wet, muddy, high speed, or frequent starting/stopping.
*D: California Model only
○: Emission Related Item

Q: Inspection
: Change or Replace
: Lubrication

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Fuel System								
○	Air cleaner element (*C)	: 2			Q		Q	2-13
○	Idle speed		Q		Q		Q	2-15
○	Throttle control system (play, smooth return, no drag)	Q:1	Q		Q		Q	2-15
○	Engine vacuum synchronization				Q		Q	2-16
	Fuel system	Q:1	Q		Q		Q	2-19
	Fuel hose	:5						2-20
○	Evaporative emission control system (*D)			Q	Q	Q	Q	2-22
Cooling System								
	Coolant level		Q		Q		Q	2-22
	Cooling system	Q:1	Q		Q		Q	2-23
	Coolant, water hoses and O-rings	:3	: every 36 000 km (22 500 mile)					2-23, 2-25
Engine Top End								
○	Valve clearance				Q		Q	2-26
○	Air suction system				Q		Q	2-29
Clutch								
	Clutch operation (play, engagement, disengagement)		Q		Q		Q	2-29
Engine Lubrication System								
	Engine oil and oil filter (*C)	:1						2-30, 2-31
Wheels and Tires								
	Tire air pressure	Q:1			Q		Q	2-32
	Wheels and tires	Q:1			Q		Q	2-32
	Wheel bearing damage	Q:1			Q		Q	2-33

Periodic Maintenance Chart

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Final Drive								
	Drive chain lubrication condition (*C)		Q: every 600 km (400 mile)					2-34
	Drive chain slack (*C)		Q: every 1 000 km (600 mile)					2-34
	Drive chain wear (*C)				Q		Q	2-36
	Drive chain guide wear				Q		Q	2-37
Brakes								
	Brake system	Q:1	Q	Q	Q	Q	Q	2-38
	Brake fluid level	Q:0.5	Q	Q	Q	Q	Q	2-39
	Brake fluid (front and rear)	↻:2					↻	2-40
	Brake hose/rubber parts of brake master cylinder and caliper	↻:4	↻: every 48 000 km (30 000 mile)					2-42, 2-43, 2-45
	Brake pad wear (*C)			Q	Q	Q	Q	2-46
	Brake light switch operation		Q	Q	Q	Q	Q	2-46
Suspension								
	Suspension system	Q: 1			Q		Q	2-47
	Lubrication of rear suspension						◣	2-48
Steering								
	Steering play	Q:1	Q		Q		Q	2-49
	Steering stem bearings	◣:2					◣	2-50
Electrical System								
	Electrical system	Q:1			Q		Q	2-51
○	Spark plugs				↻		↻	2-56
Others								
	Chassis parts	◣:1			◣		◣	2-57
	Condition of bolts, nuts and fasteners		Q		Q		Q	2-59

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or silicone sealant etc.

Letters used in the “Remarks” column mean:
G: Apply grease.
HL: Apply a non-permanent locking agent (High Strength).
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide grease oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease (ex. PBC grease).
SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Switch Housing Screws	3.5	0.36	31 in·lb	
Throttle Cable Locknuts	2.8	0.29	25 in·lb	
Delivery Pipe Assy Mounting Screws	3.4	0.35	30 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Crankshaft Sensor Screws	5.2	0.53	46 in·lb	
Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L
Oxygen Sensor (Equipped Models)	44.1	4.50	32.5	Si
Fuel Pump Bolts	9.8	1.0	87 in·lb	L
Air Cleaner Housing Cap Screws	2.5	0.25	22 in·lb	
Air Cleaner Housing Screws	1.15	0.117	10 in·lb	
Air Cleaner Housing Mounting Bolts	4.0	0.41	35 in·lb	
Air Duct Clamp Screws	2.0	0.20	18 in·lb	
Purge Valve Mounting Nut (CAL Model)	9.8	1.0	87 in·lb	
Canister Bracket Bolts (CAL Model)	9.8	1.0	87 in·lb	
Cooling System				
Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
Reserve Tank Bolts	4.0	0.41	35 in·lb	
Reserve Tank Cap	–	–	–	Hand -Tighten
Radiator Cap Bracket Bolt	9.8	1.0	87 in·lb	
Radiator Bolts	9.8	1.0	87 in·lb	
Radiator Fan Assy Mounting Bolts	8.4	0.86	74 in·lb	
Water Hose Clamp Screws	3.0	0.31	27 in·lb	
Thermostat Cover Bolts	9.8	1.0	87 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
Left Middle Fairing Bracket Bolts	9.8	1.0	87 in·lb	HL

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	9.8	1.0	87 in·lb	
Water Pump Impeller	9.8	1.0	87 in·lb	
Water Pump Bolts	9.8	1.0	87 in·lb	
Coolant Drain Bolt (Water Pump)	9.8	1.0	87 in·lb	
Water Pipe Bolt	9.8	1.0	87 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
Cylinder Head Bolts (M8, L = 146)	32	3.3	24	MO, S
Cylinder Head Bolts (M8, L = 115)	32	3.3	24	MO, S
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Spark Plugs	13	1.3	115 in·lb	
Cylinder Head Jacket Plugs	22	2.2	16	L
Camshaft Sprocket Bolts	15	1.5	11	L
Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
Cylinder Head Bolt (M6)	12	1.2	106 in·lb	S
Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
Rear Camshaft Chain Guide Bolt	17	1.7	13	
Camshaft Chain Tensioner Cap Bolt	5.0	0.51	44 in·lb	
Muffler Body Mounting Bolt	30	3.1	22	
Muffler Cover Bolt	9.8	1.0	87 in·lb	
Muffler Body Rear Cover Bolts	7.9	0.81	70 in·lb	
Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	
Exhaust Pipe Mounting Bolt	20	2.0	15	
Muffler Cover Clamp Screw	6.9	0.70	61 in·lb	
Muffler Body Clamp Bolt	13	1.3	115 in·lb	
Clutch				
Clutch Lever Clamp Bolt	8.8	0.90	78 in·lb	
Clutch Lever Pivot Bolt Locknut	1.6	0.16	14 in·lb	R
Clutch Stopper Bolts	8.83	0.90	78 in·lb	
Oil Filler Plug	–	–	–	Hand -Tighten
Clutch Cover Bolts	9.8	1.0	87 in·lb	
Clutch Hub Nut	132	13.5	97.4	
Engine Lubrication System				
Oil Pipe Banjo Bolts (Outside)	19.6	2.00	14.5	
Oil Pipe Bolt	9.8	1.0	87 in·lb	L
Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
Oil Filter	17.5	1.78	12.9	EO, R
Crankcase Oil Passage Plugs	20	2.0	15	L
Spur Gear Mounting Bolt	9.8	1.0	87 in·lb	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Pump Mounting Bolts	9.8	1.0	87 in·lb	
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oil Pressure Switch	15	1.5	11	SS
Oil Pipe Banjo Bolt (Inside)	12	1.2	106 in·lb	
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pan Bolts	9.8	1.0	87 in·lb	
Engine Oil Drain Bolt	19.6	2.00	14.5	
Engine Removal/Installation				
Front Upper Engine Mounting Bolts	69	7.0	51	
Front Lower Engine Mounting Nut	69	7.0	51	
Front Middle Engine Mounting Nut	44	4.5	32	
Rear Engine Mounting Nuts	69	7.0	51	
Crankshaft/Transmission				
Connecting Rod Big End Nuts	see the text	←	←	MO, R
Shift Drum Bearing Holder Screws	4.4	0.45	39 in·lb	L
Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
Starter Motor Clutch Bolts	34.3	3.50	25.3	L
Crankcase Bolts (M8, L = 73 mm)	23.5	2.40	17.3	MO, S
Crankcase Bolts (M6, L = 38, 60, 85 mm)	11	1.1	97 in·lb	
Crankcase Bolt (M6, L = 135 mm)	11	1.1	97 in·lb	R
Crankcase Bolts (M8, L = 90 mm)	27.5	2.80	20.3	MO, S
Gear Positioning Lever Bolt	12	1.2	106 in·lb	L
Shift Lever Bolt	12	1.2	106 in·lb	
Shift Shaft Return Spring Pin	19.6	2.0	14.5	L
Shift Drum Cam Bolt	9.0	0.92	80 in·lb	L
Tie-Rod Locknut (Front)	9.8	1.0	87 in·lb	Lh
Tie-Rod Locknut (Rear)	9.8	1.0	87 in·lb	
Neutral Switch	15	1.5	11	
Shift Pedal Mounting Bolt	12	1.2	106 in·lb	L
Wheels/Tires				
Front Axle Nut	88	9.0	65	
Rear Axle Nut	98	10.0	72	
Final Drive				
Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L
Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
Rear Sprocket Nuts	59	6.0	44	R
Engine Sprocket Nut	127	13.0	93.7	MO
Rear Axle Nut	98	10.0	72	
Brakes				
Brake Hose Banjo Bolts	25	2.5	18	
Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Bleed Valve	5.5	0.56	49 in·lb	
Front Brake Pad Pins	17.2	1.75	12.7	
Front Caliper Holder Pin Nut	22	2.2	16	L
Front Caliper Holder Pin	17.2	1.75	12.7	Si
Front Caliper Mounting Bolts	25	2.5	18	
Front Brake Disc Mounting Bolts	27	2.8	20	L
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Brake Pedal Bolt	8.8	0.90	78 in·lb	
Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
Rear Brake Pad Pins	17.2	1.75	12.7	
Rear Caliper Holder Pin Nut	22	2.2	16	L
Rear Caliper Holder Pin	17.2	1.75	12.7	Si
Rear Caliper Mounting Bolts	25	2.5	18	
Rear Brake Disc Mounting Bolts	27	2.8	20	L
Front Wheel Rotation Sensor Bolt (ABS Equipped Models)	9.8	1.0	87 in·lb	L
Brake Pipe Joint Nuts (ABS Equipped Models)	18	1.8	13	
Rear Wheel Rotation Sensor Bolt (ABS Equipped Models)	9.8	1.0	87 in·lb	L
Suspension				
Front Fork Upper Clamp Bolts	20	2.0	15	
Front Fork Lower Clamp Bolts	30	3.1	22	
Front Fork Bottom Allen Bolts	20	2.0	15	AD
Rear Shock Absorber Nuts	59	6.0	44	R
Swingarm Pivot Shaft Nut	98	10.0	72	
Rocker Arm Nut	59	6.0	44	R
Tie-Rod Nuts	59	6.0	44	R
Steering				
Switch Housing Screws	3.5	0.36	31 in·lb	
Handlebar Mounting Bolts	25	2.5	18	
Steering Stem Head Bolt	44	4.5	32	
Front Fork Upper Clamp Bolts	20	2.0	15	
Steering Stem Nut	20	2.0	15	
Front Fork Lower Clamp Bolts	30	3.1	22	
Frame				
Front Footpeg Bracket Bolts	25	2.5	18	
Rear Footpeg Bracket Bolts	25	2.5	18	
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
Sidestand Nut	39	4.0	29	R
Left Middle Fairing Bracket Bolts	9.8	1.0	87 in·lb	HL

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Electrical System				
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Spark Plugs	13	1.3	115 in·lb	
Crankshaft Sensor Screws	5.2	0.53	46 in·lb	
Alternator Rotor Bolt	107.8	10.99	79.51	S
Stator Coil Bolts	12	1.2	106 in·lb	
Regulator/rectifier Mounting Bolts	9.8	1.0	87 in·lb	
Alternator Cover Plug	–	–	–	Hand -Tighten
Alternator Cover Bolts	9.8	1.0	87 in·lb	
Alternator Rotor Bolt Cap	–	–	–	Hand -Tighten
Starter Motor Clutch Bolts	34.3	3.50	25.3	L
Starter Motor Cable Terminal Nut	9.8	1.0	87 in·lb	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Starter Motor Terminal Locknut	11	1.1	97 in·lb	
Starter Motor Brush Holder Screw	3.8	0.39	34 in·lb	
Starter Motor Through Bolts	5.0	0.51	44 in·lb	
Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L
Fuel Pump Bolts	9.8	1.0	87 in·lb	L
Water Temperature Sensor	12	1.2	106 in·lb	
Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oil Pressure Switch	15	1.5	11	SS
Oxygen Sensor (Equipped Models)	44.1	4.50	32.5	Si
Neutral Switch	15	1.5	11	
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L

Torque and Locking Agent

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23.0 ~ 33.0	165 ~ 240

Specifications

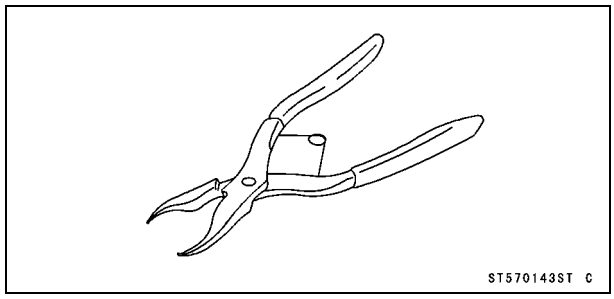
Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 300 ±50 r/min (rpm)	– – –
Throttle Body Vacuum	24.7 ±1.33 kPa (185 ±10 mmHg) at idle speed	– – –
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)	– – –
Main Throttle Sensor Output Voltage	DC 1.020 ~ 1.050 V at idle throttle opening	– – –
Air Cleaner Element	Polyurethane foam	– – –
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of antifreeze	– – –
Color	Green	– – –
Mixed Ratio	Soft water 50%, Coolant 50%	– – –
Freezing Point	–35°C (–31°F)	– – –
Total Amount	1.5 L (1.6 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)	– – –
Intake	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	– – –
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Capacity	2.0 L (2.1 US qt) (when filter is not removed)	– – –
	2.2 L (2.3 US qt) (when filter is removed)	– – –
	2.4 L (2.5 US qt) (when engine is completely dry)	– – –
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)	– – –
Wheels/Tires		
Tread Depth:		
Front	4.2 mm (0.17 in.)	1 mm (0.04 in.), (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	6.4 mm (0.25 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.), Over 130 km/h (80 mph): 3 mm (0.12 in.)

Specifications

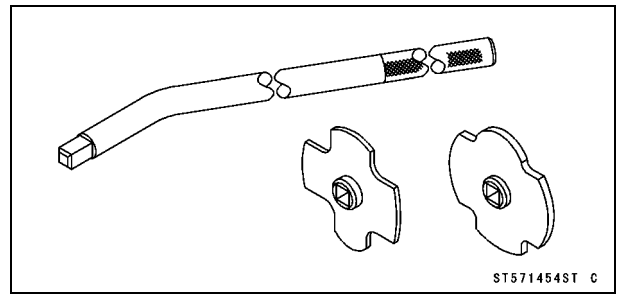
Item	Standard	Service Limit
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –
Final Drive		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.56 in.)
Standard Chain:		
Make	ENUMA L.G.B. (when shipping) DAIDO (when shipping) (BR Model)	– – – – – – – – –
Type	EK520SRO R520HPXR (when shipping) DID 520VD2 (when shipping) (BR Model)	– – – – – – – – –
Link	106 links	– – –
Brakes		
Brake Fluid:		
Grade:		
Front	DOT3 or DOT4	– – –
Rear	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4.5 mm (0.18 in.)	1.5 mm (0.06 in.) 1 mm (0.04 in.) (ABS equipped models)
Rear	4.5 mm (0.18 in.)	1.5 mm (0.06 in.)
Brake Light Timing:		
Front	Pulled ON	– – –
Rear	ON after about 10 mm (0.39 in.) of pedal travel	– – –
Electrical System		
Spark Plug:		
Type	NGK CR8E	– – –
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –

Special Tools

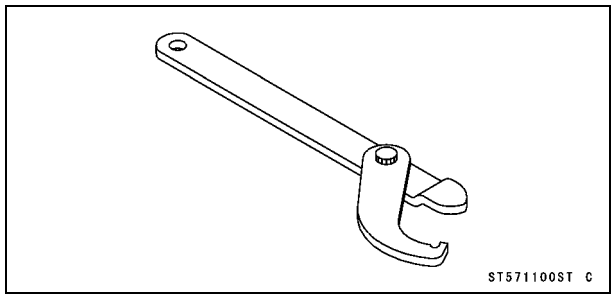
Inside Circlip Pliers:
57001-143



Filler Cap Driver:
57001-1454



Steering Stem Nut Wrench:
57001-1100



Throttle Sensor Setting Adapter:
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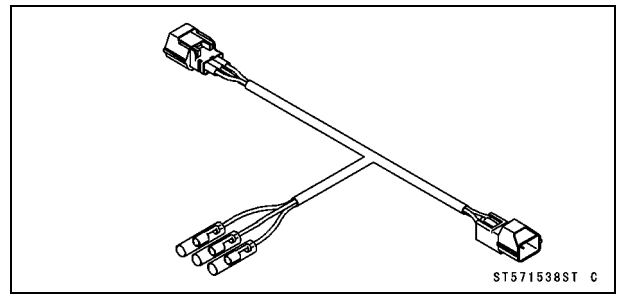
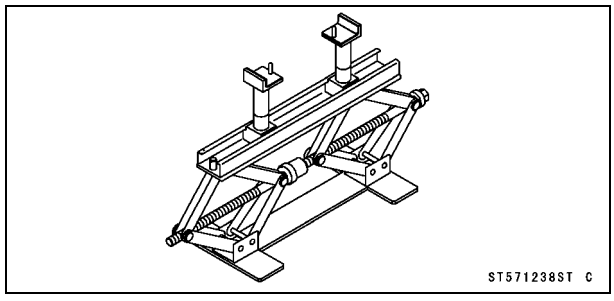
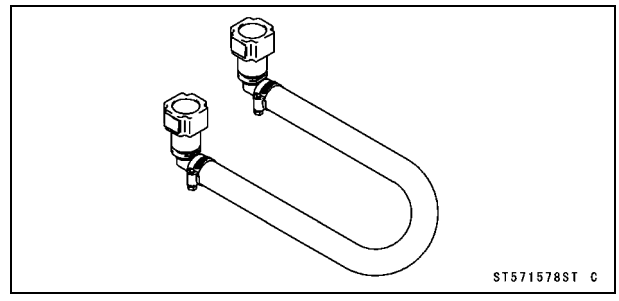


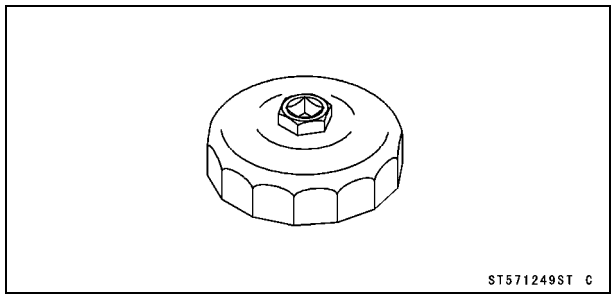
Jack:
57001-1238



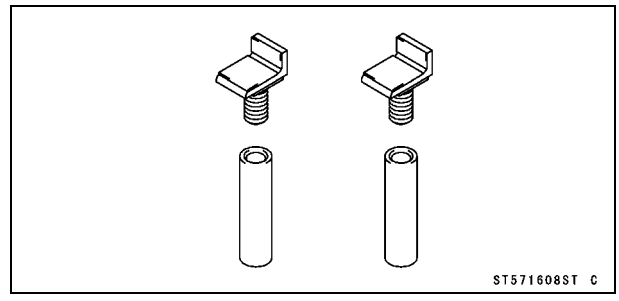
Extension Tube:
57001-1578



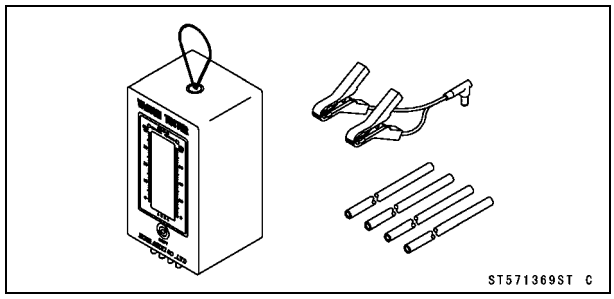
Oil Filter Wrench:
57001-1249



Jack Attachment:
57001-1608



Vacuum Gauge:
57001-1369



Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Cleaning

NOTE

○*In dusty areas, the element should be cleaned more frequently than the recommended interval.*

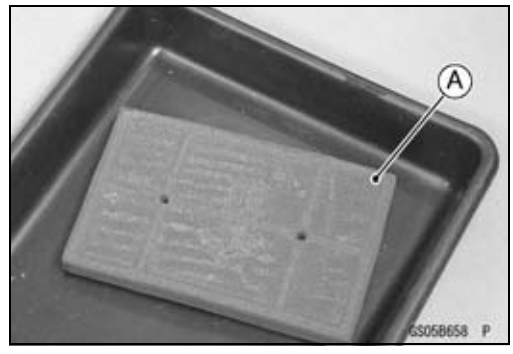
⚠ WARNING

If dirt or dust is allowed to pass through into the throttle assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

NOTICE

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

● Remove the element (see Air Cleaner Element Replacement).



⚠ WARNING

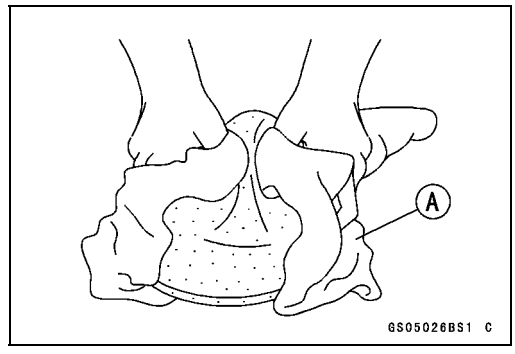
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the element in a well-ventilated area, and take care that there is no spark or flame anywhere near the working areas. Do not use gasoline or low flash-point solvents to clean the element.

● Clean the element [A] in a bath of high flash-point solvent.

● Squeeze it dry in a clean towel [A]. Do not wring the element or blow it dry; the element can be damaged.

● Check all the parts of the element for visible damage.

★If any of the parts of the element are damaged, replace them.



● After cleaning, saturate the element with a high-quality foam-air-filter oil, squeeze out the excess, then wrap it in a clean towel and squeeze it as dry as possible.

○Be careful not to tear the sponge filter.

Periodic Maintenance Procedures

Air Cleaner Element Replacement

NOTE

○In dusty areas, the element should be replaced more frequently than the recommended interval.
○After riding through rain or on muddily roads, the element should be replaced immediately.

⚠ WARNING

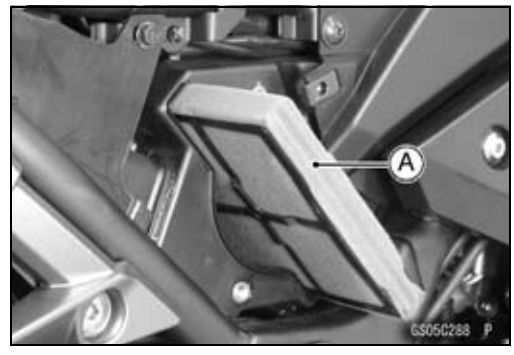
If dirt or dust is allowed to pass through into the throttle assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

NOTICE

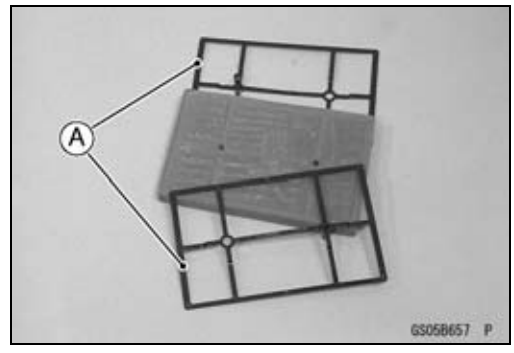
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

● Remove:
Right Side Cover (see Side Cover Removal in the Frame chapter)
Air Cleaner Housing Cap Bolts/Screws [A]
Air Cleaner Housing Cap [B]

● Pull out the air cleaner element [A].



● Separate the plastic holders [A].

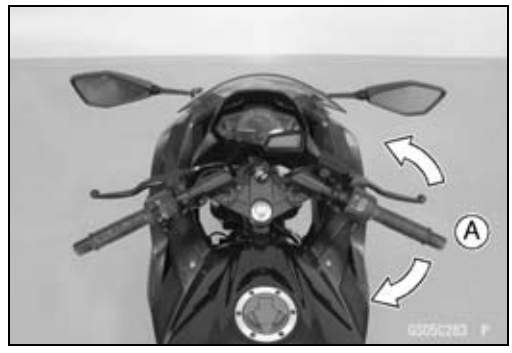


● Install a new element and air cleaner housing cap.
● Tighten:

Torque - Air Cleaner Housing Cap Screws: 2.5 N·m (0.25 kgf·m, 22 in·lb)

Periodic Maintenance Procedures

Idle Speed Inspection



- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebars to both sides [A].

★If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed or damaged. Be sure to correct any of these conditions before riding (see Throttle Control System Inspection and Cable, Wire, and Hose Routing section in the Appendix chapter).

⚠ WARNING

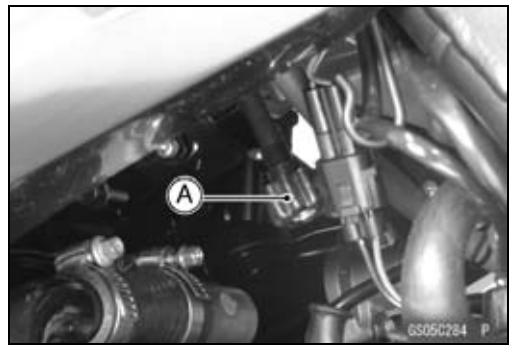
Operation with improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding Condition. Follow the service manual to be make sure to correct any of these conditions.

- Check the idle speed.

Idle Speed
Standard: 1 300 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it.

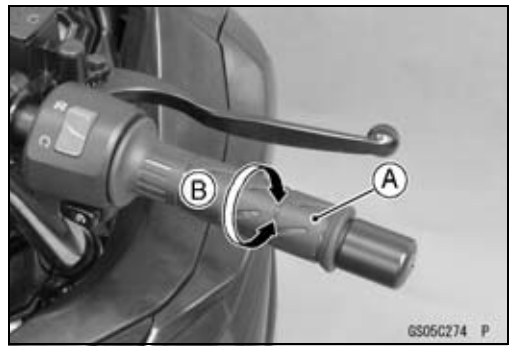
Idle Speed Adjustment



- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until the idle speed is correct.

○Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

Throttle Control System Inspection

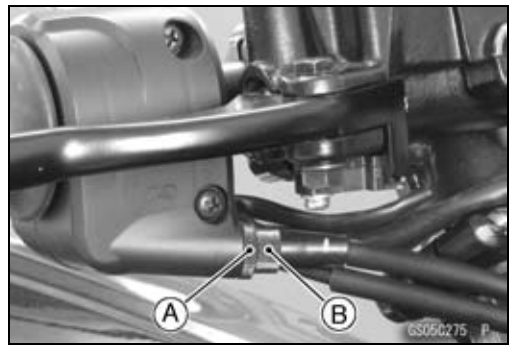


- Check that the throttle grip [A] moves smoothly from full open to close, and the throttle closes quickly and completely by the return spring in all steering positions.

★If the throttle grip does not return properly, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.

- Check the throttle grip free play [B].

Throttle Grip Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.

★If the idle speed increases, check the throttle cable free play and the cable routing.

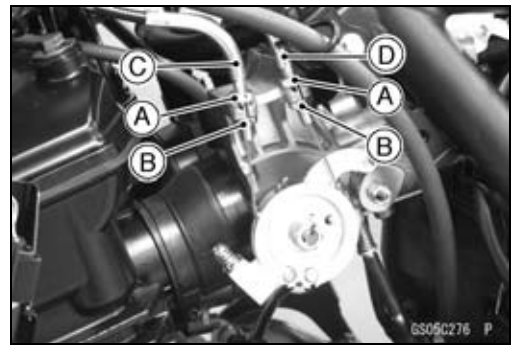
★If necessary, adjust the throttle cable as follows.

- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of free play can be obtained.
- Tighten the locknut against the adjuster securely.

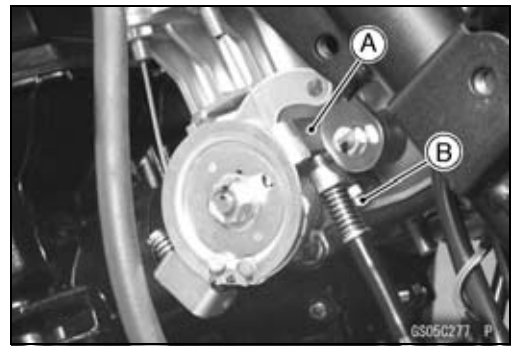
Periodic Maintenance Procedures

★If the throttle grip free play can not be adjusted with the adjuster, use the adjusters in the lower ends of the throttle cables.

- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Turn out both upper nuts [A] and turn in both lower nuts [B] as far as they will go so as to give the throttle grip plenty of play.
- With the throttle grip completely closed, turn out the lower nut and turn in the upper nut of the decelerator cable [C] until the inner cable just becomes tight.
- Turn out the lower nut and turn in the upper nut of the accelerator cable [D] until the correct free play is obtained.



- Check that the throttle linkage lever [A] stops against the adjusting screw [B] with the throttle grip closed.

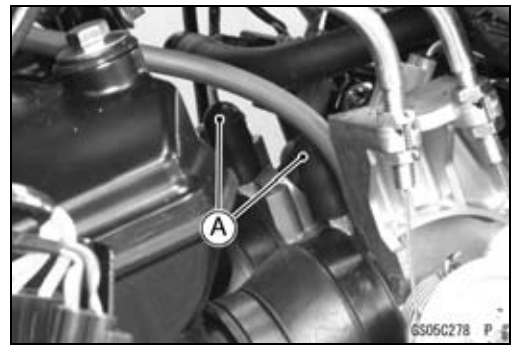


Engine Vacuum Synchronization Inspection

NOTE

○*These procedures are explained on the assumption that the intake and exhaust systems of the engine are in good condition.*

- Situate the motorcycle so that it is vertical.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Remove the rubber caps [A] from the fittings of each throttle body.



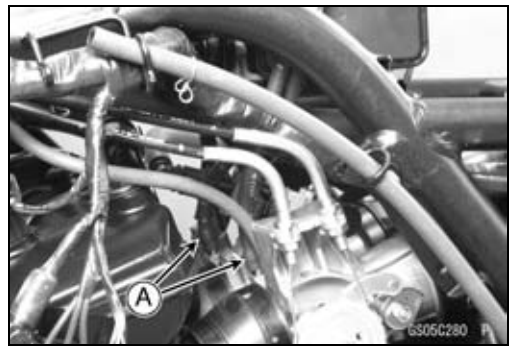
- Disconnect the air switching valve hose [A] from the air cleaner housing.
- Plug the air switching valve hose end and air cleaner housing fitting.

Periodic Maintenance Procedures

- Connect a vacuum gauge (special tool) and hoses [A] to the fittings on the throttle body.

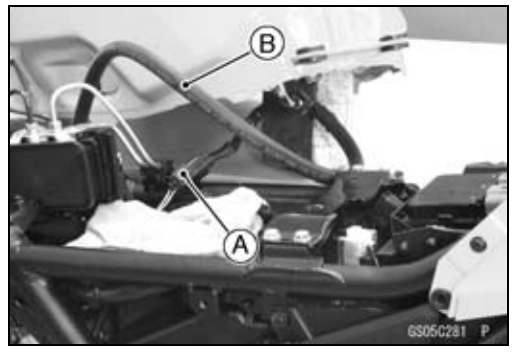
  Special Tool - Vacuum Gauge: 57001-1369

- Connect a highly accurate tachometer to one of the stick coil primary leads.



- Remove the fuel hose (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Connect the following parts temporary.
  Fuel Pump Lead Connector [A]
  Extension Tube [B]

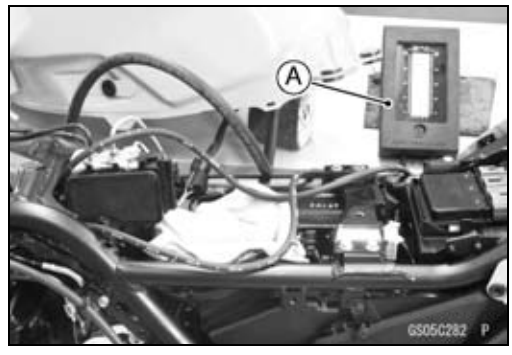
  Special Tool - Extension Tube: 57001-1578



- Start the engine and warm it up thoroughly.
- Check the idle speed, using a highly accurate tachometer.

  Idle Speed
  Standard: 1 300 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it with the adjusting screw (see Idle Speed Adjustment).



NOTICE

Do not measure the idle speed by the tachometer of the meter unit.

- While idling the engine, inspect the throttle body vacuum, using the vacuum gauge [A].

  Throttle Body Vacuum
  Standard: 24.7 ±1.33 kPa (185 ±10 mmHg) at idle speed

★If any one vacuum is not within the specification, turn in the bypass screws until it seats fully but not tightly.

NOTICE

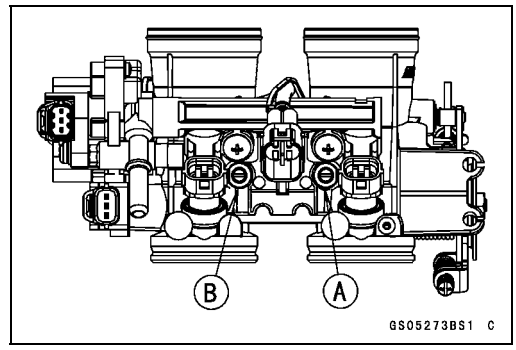
Do not over tighten them. They could be damaged, requiring replacement.

Periodic Maintenance Procedures

- Turn out the bypass screw of the higher vacuum between #1 [A] and #2 [B] to the lower vacuum.
- Open and close the throttle valves after each measurement and adjust the idle speed as necessary.
- Inspect the vacuums as before.

★If both vacuums are within the specification, finish the engine vacuum synchronization.

★If any vacuum can not be adjusted within the specification, remove the bypass screws #1, #2 and clean them.



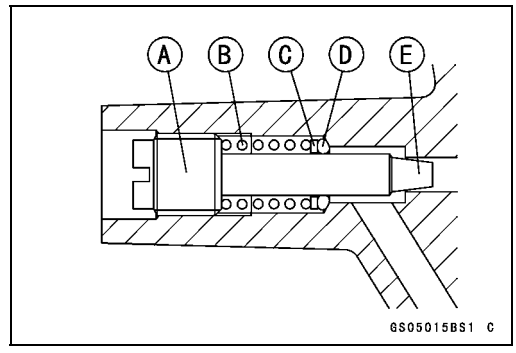
- Remove:
  Bypass Screw [A]
  Spring [B]
  Washer [C]
  O-ring [D]
- Check the bypass screw and its hole for carbon deposits.

★If any carbons accumulate, wipe the carbons off from the bypass screw and the hole, using a cotton pad penetrated with a high flash-point solvent.

- Replace the O-ring with a new one.
- Check the tapered portion [E] of the bypass screw for wear or damage.

★If the bypass screw is worn or damaged, replace it.

- Turn in the bypass screw until it seats fully but not tightly.



- Repeat the same procedure for other bypass screw.
- Repeat the synchronization.

★If the vacuums are correct, check the output voltage of the main throttle sensor (see Main Throttle Sensor Output Voltage Inspection in the Fuel System (DFI) chapter).

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Main Throttle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor Y/W) lead
Digital Meter (–) → W (sensor BR/BK) lead

Standard: DC 1.020 ~ 1.050 V at idle throttle opening

★If the output voltage is out of the standard, check the input voltage of the main throttle sensor (see Main Throttle Sensor Input Voltage Inspection in the Fuel System (DFI) chapter).

- Remove the vacuum gauge hoses and install the rubber caps on the original position.

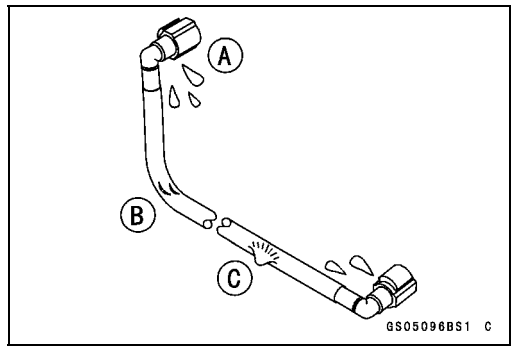
Periodic Maintenance Procedures

Fuel System

Fuel Hose Inspection (fuel leak, damage, installation condition)

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter) and check the fuel hose.

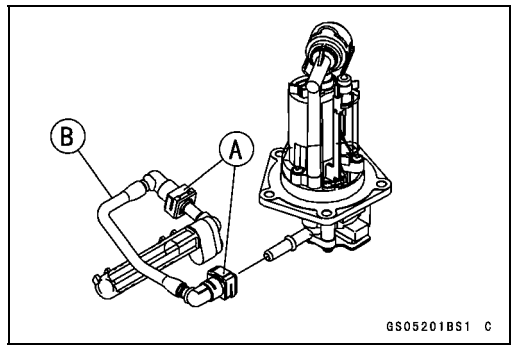
★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.



● Check that the hose is routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.

★Replace the hose if it has been sharply bent or kinked.

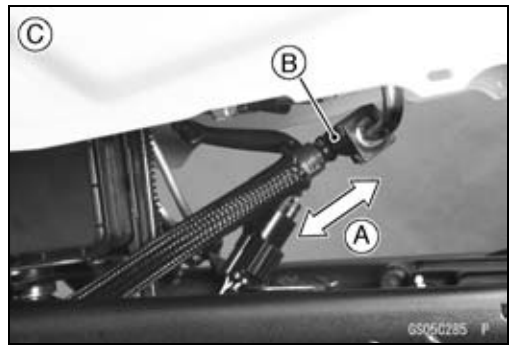
Hose Joints [A]
Fuel Hose [B]



● Check that the hose joints are securely connected.

○Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

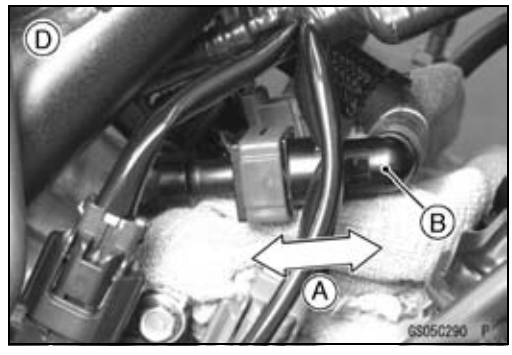
Fuel Pump Side [C]
Throttle Body Assy Side [D]



⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.

★If it comes off, reinstall the hose joint.



Periodic Maintenance Procedures

Fuel Hose Replacement

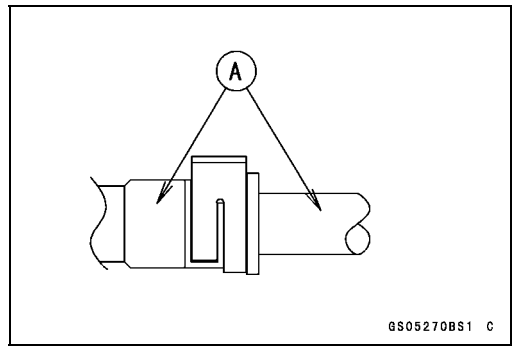
⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

NOTICE

When removing and installing the fuel hose joint, do not apply strong force to the outlet pipe on the fuel pump and delivery pipe on the throttle body assy. The pipes made from resin could be damaged.

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

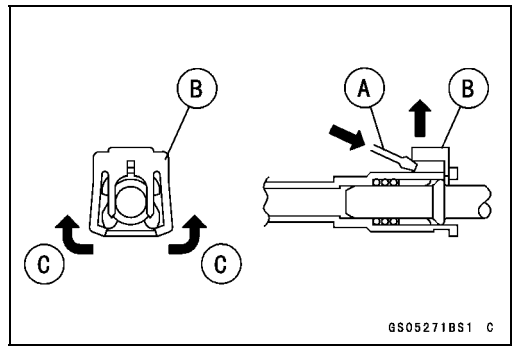


When removing with standard tip screwdriver

- Insert the standard tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

When removing with fingers

- Open and push up [C] the joint lock with your fingers.



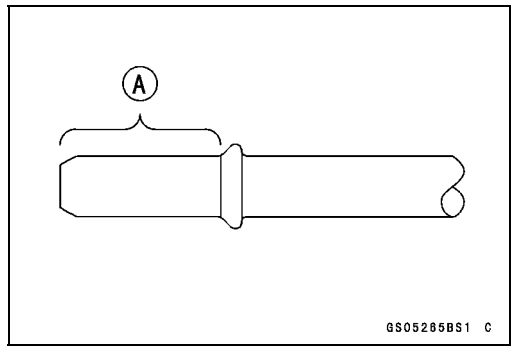
NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.

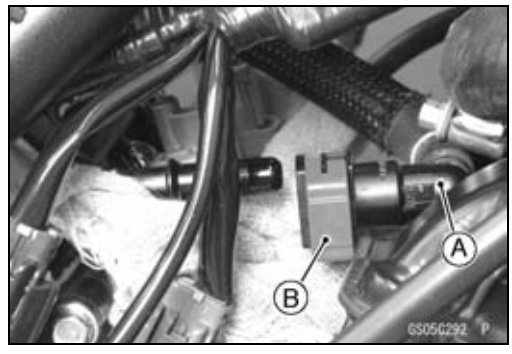
Periodic Maintenance Procedures

● Pull the fuel hose joint [A] out of the delivery pipe.

● Clean the delivery pipe.
● Cover the delivery pipe with the vinyl bag to keep it clean.
● Remove the vinyl bag on the pipe.
● Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].
● Replace the fuel hose with a new one.



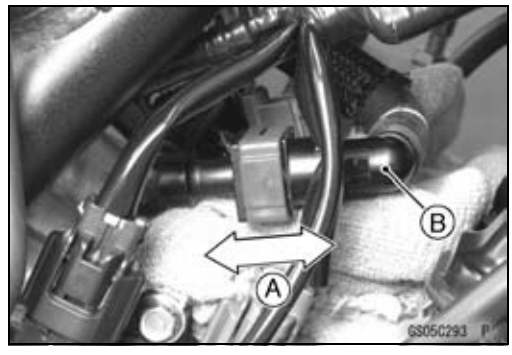
● Install the fuel hose so that the white mark side faces delivery pipe of the fuel pump.
● Insert the fuel hose joint [A] straight onto the delivery pipe until the hose joint clicks.
● Push the joint lock [B] until the hose joint clicks.



● Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

⚠ WARNING

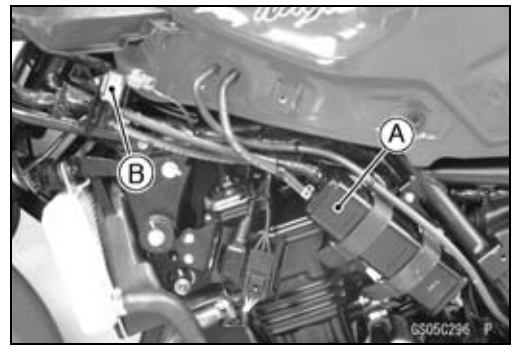
Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.



★If it comes off, reinstall the hose joint.
● Run the fuel hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).
● Start the engine and check the fuel hose for leaks.

Periodic Maintenance Procedures

Evaporative Emission Control System Inspection (CAL Model)



● Inspect the canister as follows.
○Remove:
Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
○Remove the canister [A], and disconnect the hoses from the canister.
○Visually inspect the canister for cracks or other damage.
★If the canister has any cracks or bad damage, replace it with a new one.

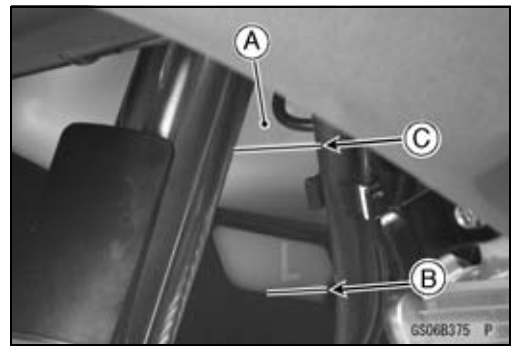
NOTE

○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

● Inspect the purge valve [B] (see Purge Valve Inspection in the Fuel System (DFI) chapter).
○Check that the hoses are securely connected and clips are in position.
○Replace any kinked, deteriorated or damaged hoses.
○Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
○When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.

Cooling System

Coolant Level Inspection



NOTE

○*Check the level when the engine is cold (room or ambient temperature).*

● Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the sidestand.).
★If the coolant level is lower than the "L" level line [B], unscrew the reserve tank cap and add coolant to the "F" level line [C].
"L": low
"F": full

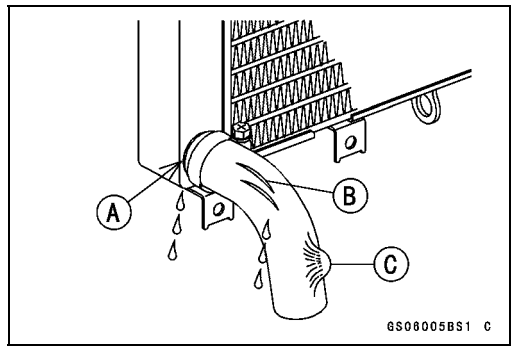
NOTICE

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
If coolant must be added often or the reserve tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.
Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Periodic Maintenance Procedures

Cooling System

Water Hose and Pipe Inspection (coolant leak, damage, installation condition)



○The high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.

- Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

- Check that the hoses are securely connected and clamps are tightened correctly.

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

Coolant Change

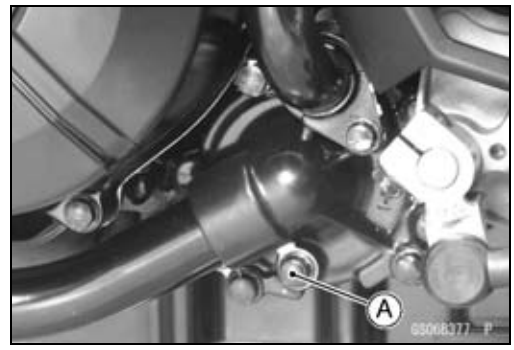
⚠ WARNING

Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

- Remove the middle fairings (see Middle Fairing Removal in the Frame chapter).
- Remove the radiator cap [A] in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

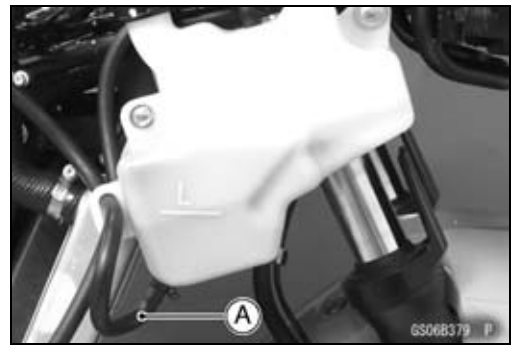
Periodic Maintenance Procedures

● Place a container under the coolant drain bolts [A], then remove the drain bolts.
○The coolant will drain from the radiator and engine.



● Remove the hose [A].
● Pour the coolant into a suitable container.
● Install the hose.
● Tighten the drain bolts with the gasket.
○Replace the drain bolt gaskets with new ones.

Torque - Coolant Drain Bolt (Water Pump): 9.8 N·m (1.0 kgf·m, 87 in·lb)
Coolant Drain Bolt (Cylinder): 5.9 N·m (0.60 kgf·m, 52 in·lb)



● When filling the coolant, choose a suitable mixture ratio by referring to the coolant manufacturer's directions.

NOTICE

Soft or distilled water must be used with the antifreeze in the cooling system.
If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.

Water and Coolant Mixture Ratio (Recommended)

Soft Water:	**50%**
Coolant:	**50%**
Freezing Point:	**–35°C (–31°F)**
Total Amount:	**1.5 L (1.6 US qt)**

Periodic Maintenance Procedures

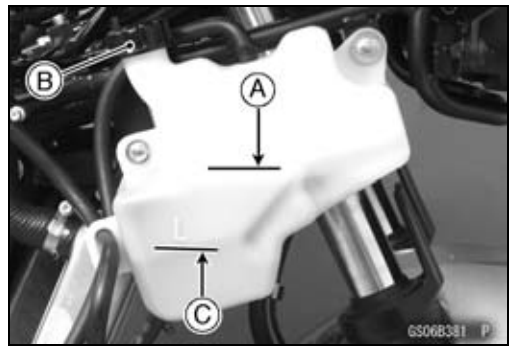
● Fill the radiator up to the filler neck [A] with coolant.

NOTE

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*

● Check the cooling system for leaks.
● Tap the radiator hoses to force any air bubbles caught inside.
● Fill the radiator up to the filler neck with coolant.

● Fill the reserve tank up to the “F” (full) level line [A] with coolant and install the cap [B].
● Install the radiator cap.
● Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
● Check the coolant level in the reserve tank after the engine cools down.
★If the coolant level is lower than the “L” (low) level line [C], add coolant to the “F” level line.



NOTICE

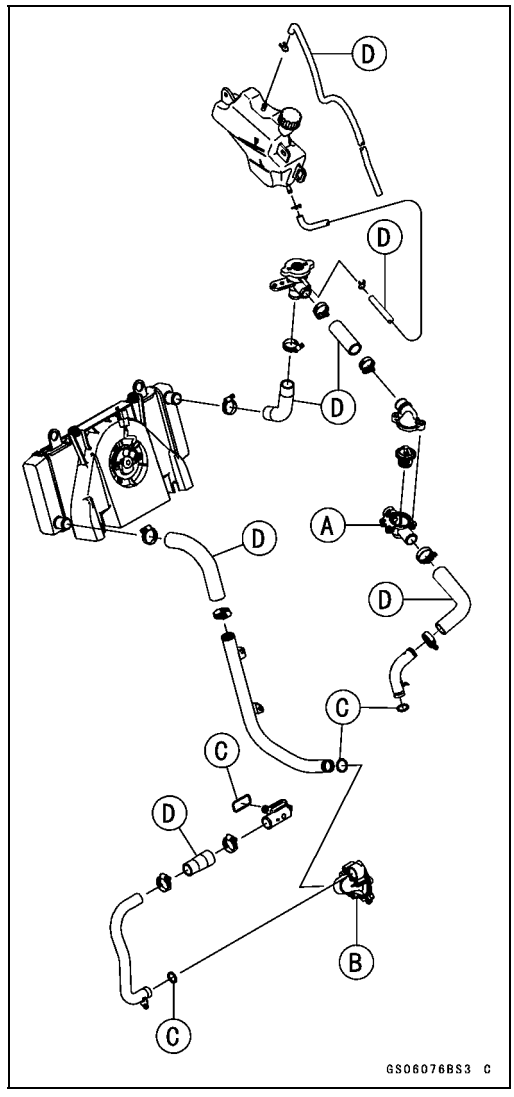
Do not add more coolant above the “F” level line.

Water Hose and O-ring Replacement

● Drain the coolant (see Coolant Change).
● Remove:
Thermostat Housing [A] (see Thermostat Housing Removal in the Cooling System chapter)
Water Pump Cover [B] (see Water Pump Cover Removal in the Cooling System chapter)
O-rings [C]
Hoses [D]
● Apply grease to the new O-rings and install them.
● Install the new hoses and tighten the clamps securely.

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

● Fill the coolant (see Coolant Change).
● Check the cooling system for leaks.



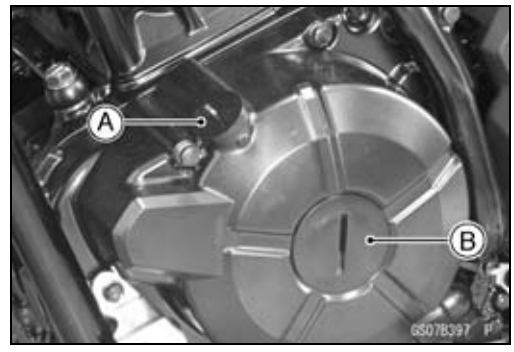
Periodic Maintenance Procedures

Engine Top End

Valve Clearance Inspection

NOTE

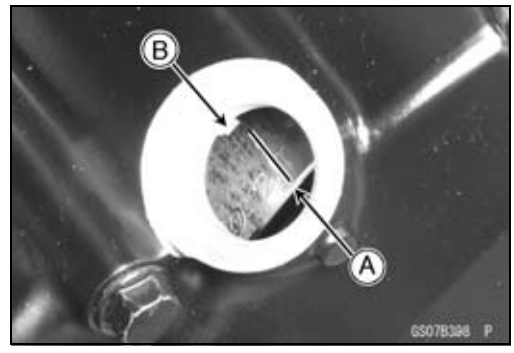
○*Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*



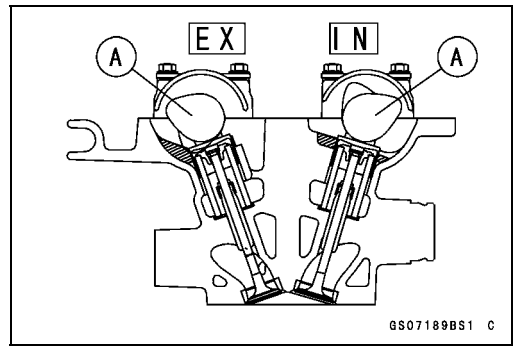
● Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)
Plugs [A] [B]

Special Tool - Filler Cap Driver: 57001-1454

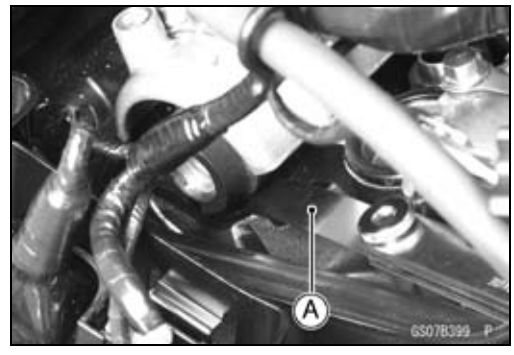
● Check the valve clearance when the pistons are at TDC.
○The pistons are numbered beginning with the engine left side.
● Using a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the “2T” mark [A] on the alternator rotor is aligned with the projection [B] in the inspection window on the alternator cover.



○Measure the valve clearance of the valves for which the cam [A] are turned away from each other.



● Using the thickness gauge [A], measure the valve clearance between the cam and the valve lifter.



Valve Clearance
Standard:
Exhaust 0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)
Intake 0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)

○Each piston has two intake and two exhaust valves. Measure these two intake or exhaust valves at the same crankshaft position.

Valve Clearance Measuring Position
#1 Piston TDC at End of Compression Stroke:
Intake Valve Clearances of #1 Piston
Exhaust Valve Clearances of #1 Piston

NOTE

○*Check the valve clearance using this method only. Checking the clearance at any other cam position may result in improper valve clearance.*

Periodic Maintenance Procedures

Valve Clearance Measuring Position
#2 Piston TDC at End of Compression Stroke:
Intake Valve Clearances of #2 Piston
Exhaust Valve Clearances of #2 Piston

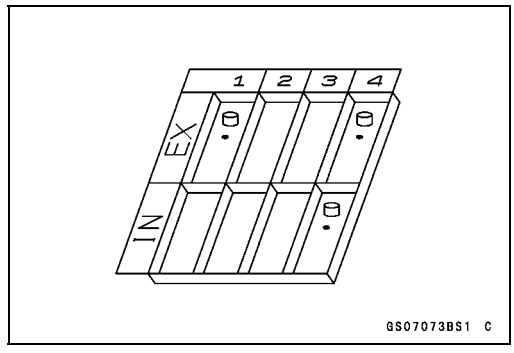
★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

Valve Clearance Adjustment

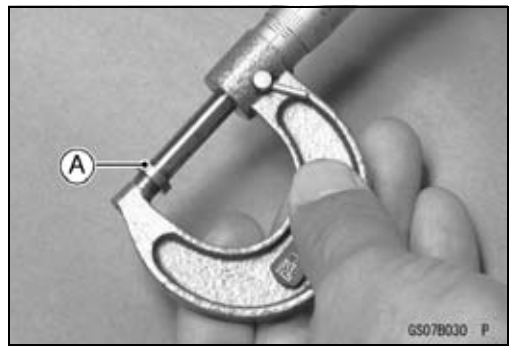
● To change the valve clearance, remove the camshaft chain tensioner, camshafts and valve lifters. Replace the shim with one of a different thickness.

NOTE

○*Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.*



● Clean the shim to remove any dust or oil.
● Measure the thickness of the removed shim [A].
● Select a new shim thickness calculation as follows.
a + b – c = d
[a] Present Shim Thickness
[b] Measured Valve Clearance
[c] Specified Valve Clearance (Mean Value = 0.26 mm (Exhaust), 0.20 mm (Intake))
[d] Replace Shim Thickness



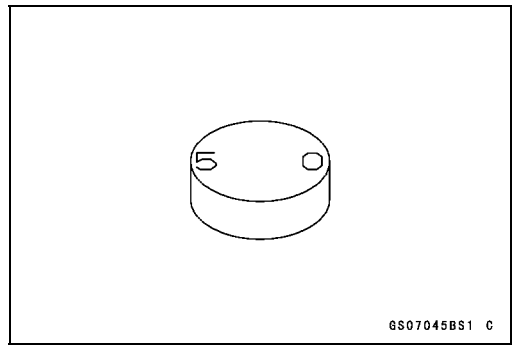
Example (Intake):
2.90 + 0.45 – 0.20 = 3.15 mm

○Exchange the shim for the 3.15 size shim.

Periodic Maintenance Procedures

Adjustment Shims

Thickness	Part Number	Mark
2.50	92180-1014	50
2.55	92180-1016	55
2.60	92180-1018	60
2.65	92180-1020	65
2.70	92180-1022	70
2.75	92180-1024	75
2.80	92180-1026	80
2.85	92180-1028	85
2.90	92180-1030	90
2.95	92180-1032	95
3.00	92180-1034	00
3.05	92180-1036	05
3.10	92180-1038	10
3.15	92180-1040	15
3.20	92180-1042	20
3.25	92180-1044	25
3.30	92180-1046	30
3.35	92180-1048	35
3.40	92180-1050	40
3.45	92180-1052	45
3.50	92180-1054	50



NOTICE

Be sure to remeasure the clearance after selecting a shim. If the clearance is out of the specified range, use the additional shim.

○If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

- When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim to keep the shim in place during camshaft installation.

NOTICE

Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

- Apply molybdenum disulfide oil solution to the valve lifter surface and install the lifter.
- Install the camshaft (see Camshaft Installation in the Engine Top End chapter).
- Recheck the valve clearance and readjust if necessary.
- Install the removed parts (see appropriate chapters).

Periodic Maintenance Procedures

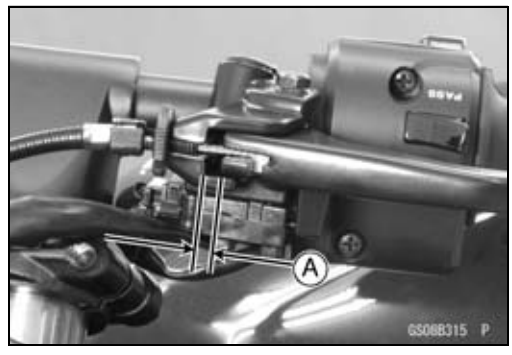
Air Suction System Damage Inspection

- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
  Fuel Tank Bolts (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Remove the air switching valve hose [A] from the air cleaner housing.
- Start the engine and run it at idle speed.
- Plug the air switching valve hose end with your finger and feel vacuum pulsing in the hose.

★If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (see Air Switching Valve Unit Test in the Electrical System chapter) or air suction valve (see Air Suction Valve Inspection in the Engine Top End chapter).

Clutch

Clutch Operation Inspection



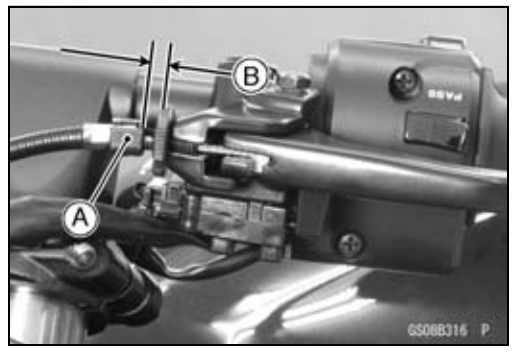
- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

Clutch Lever Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

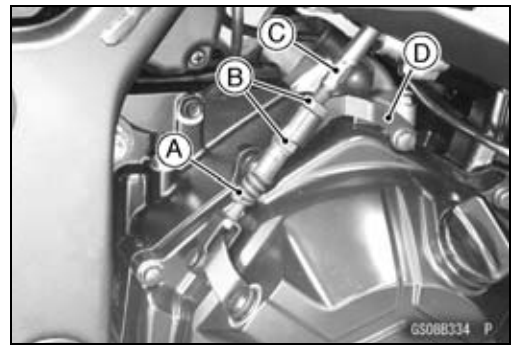
⚠ WARNING

The engine and exhaust system get extremely hot during normal operation and can cause serious burns. Never touch the engine or exhaust pipe during clutch adjustment.



- Turn the adjuster [A] so that 5 ~ 6 mm (0.20 ~ 0.24 in.) [B] of threads are visible.

Periodic Maintenance Procedures



- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the cable holder [D].
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.

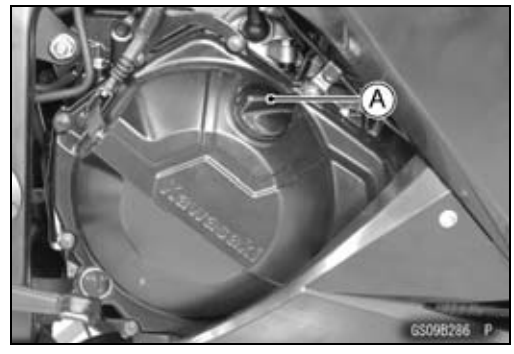
⚠ WARNING

Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

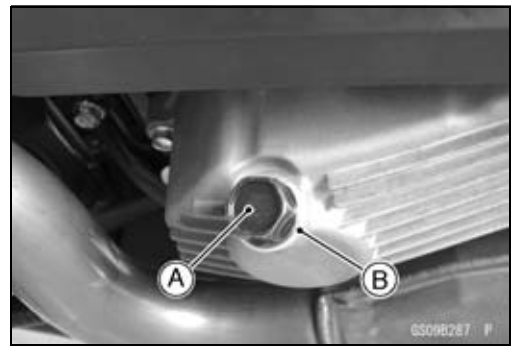
- After the adjustment, start the engine and check that the clutch does not slip and that it releases properly.

Engine Lubrication System

Engine Oil Change



- Situate the motorcycle so that it is vertical after warming up the engine.
- Unscrew the oil filler plug [A].



- Place the oil pan beneath the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

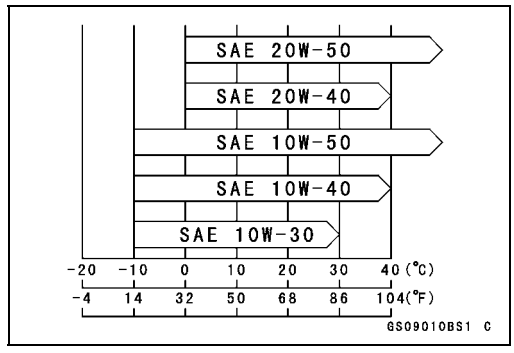
○The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement).

- Replace the drain bolt gasket [B] with a new one.
- Tighten:

Torque - Engine Oil Drain Bolt: 19.6 N·m (2.00 kgf·m, 14.5 ft·lb)

Periodic Maintenance Procedures

● Pour in the specified type and amount of oil.



Recommended Engine Oil

Type:	**API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**
Viscosity:	**SAE 10W-40**
Capacity:	**2.0 L (2.1 US qt) (when filter is not removed)**
	2.2 L (2.3 US qt) (when filter is removed)
	2.4 L (2.5 US qt) (when engine is completely dry)

NOTE

○*Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.*

○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*

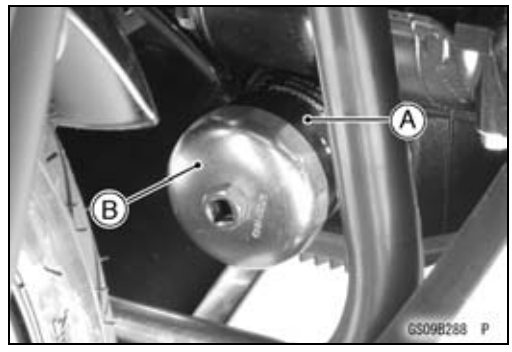
● Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).

Oil Filter Replacement

● Drain the engine oil (see Engine Oil Change).

● Remove the oil filter [A] with the oil filter wrench [B].

Special Tool - Oil Filter Wrench: 57001-1249

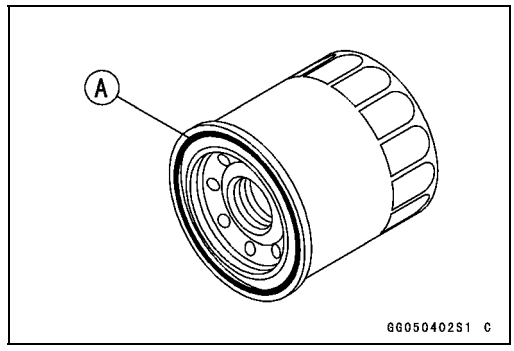


● Replace the filter with a new one.

● Apply engine oil to the O-ring [A] before installation.

● Tighten the filter with the oil filter wrench.

Torque - Oil Filter: 17.5 N·m (1.78 kgf·m, 12.9 ft·lb)



NOTE

○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

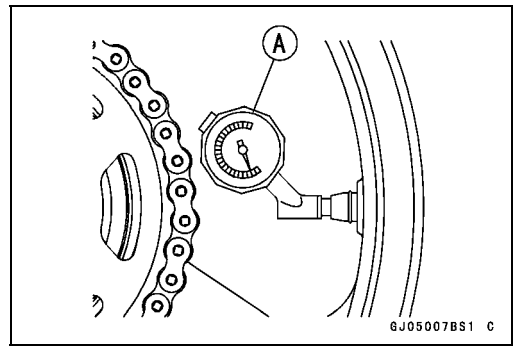
● Pour in the specified type and amount of oil (see Engine Oil Change).

● Install the removed parts (see appropriate chapters).

Periodic Maintenance Procedures

Wheels/Tires

Air Pressure Inspection



- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).
- Install the air valve cap.

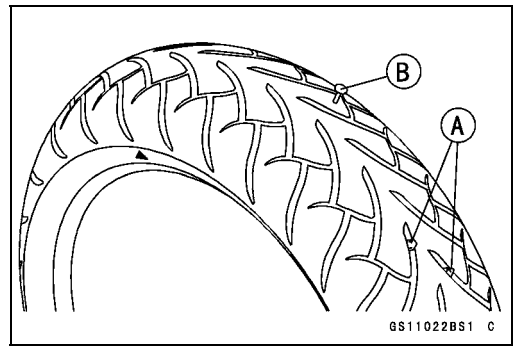
★Adjust the tire air pressure according to the specifications if necessary.

Air Pressure (when Cold)

Front:	**Up to 180 kg (397 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)**
Rear:	**Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)**

Wheels and Tires

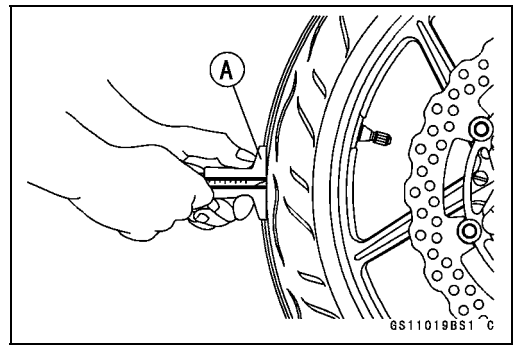
Wheel/Tire Damage Inspection



- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.

★If any damage is found, replace the wheel if necessary.

Tire Tread Wear Inspection



As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.

★If any measurement is less than the service limit, replace the tire (see Tire Removal/Installation in the Wheels/Tires chapter).

Periodic Maintenance Procedures

Tread Depth

Standard:

Front	**4.2 mm (0.17 in.)**
Rear	**6.4 mm (0.25 in.)**

Service Limit:

Front	**1 mm (0.04 in.)**
	(AT, CH, DE) 1.6 mm (0.06 in.)
Rear	**2 mm (0.08 in.) (Up to 130 km/h (80 mph))**
	3 mm (0.12 in.) (Over 130 km/h (80 mph))

⚠ WARNING

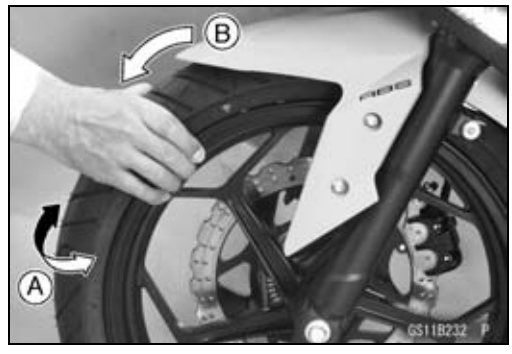
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

NOTE

○*Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.*

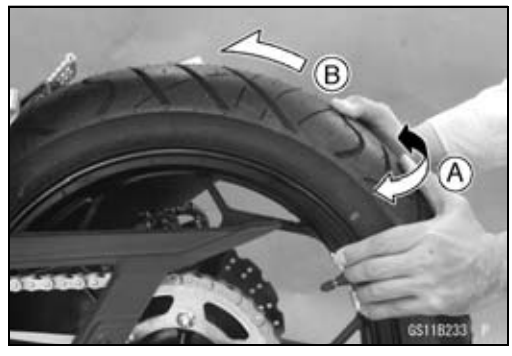
○*Check and balance the wheel when a tire is replaced with a new one.*

Wheel Bearing Damage Inspection



- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Front Wheel Removal, Hub Bearing Inspection in the Wheels/Tires chapter).



- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- Inspect the roughness of the rear wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the rear wheel and inspect the wheel bearing (see Rear Wheel Removal, Hub Bearing Inspection in the Wheels/Tires chapter) and coupling (see Coupling Bearing Inspection in the Final Drive chapter).

Periodic Maintenance Procedures

Final Drive

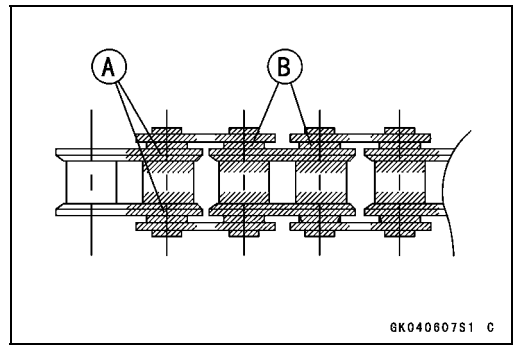
Drive Chain Lubrication Condition Inspection

- If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.
- If the chain appears especially dirty, clean it before lubrication.

NOTICE

The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
Use only kerosene or diesel oil for cleaning of the O-ring of the drive chain. Any other cleaning solution such as gasoline will cause deterioration and swelling of the O-ring. Immediately blow the chain dry with compressed air after cleaning. Complete cleaning and drying the chain within 10 minutes.

- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.
  Oil Applied Areas [A]
  O-rings [B]



Drive Chain Slack Inspection

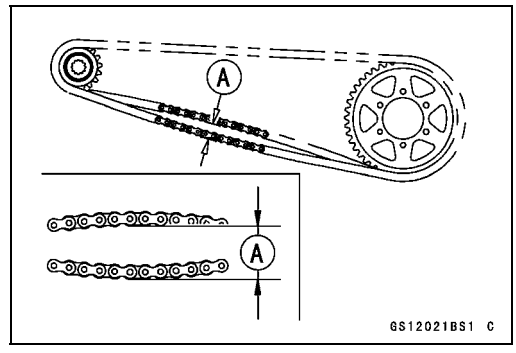
NOTE

○*Check the slack with the motorcycle setting on its sidestand.*
○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

- Check the wheel alignment (see Wheel Alignment Inspection).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.

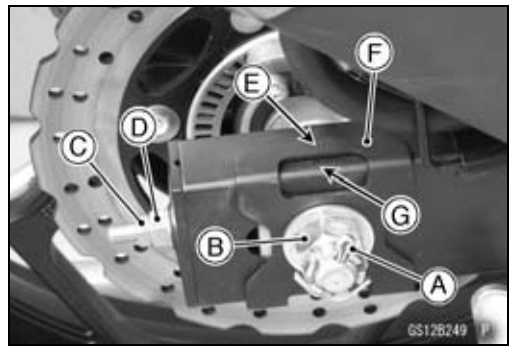
★If the chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 20 ~ 30 mm (0.8 ~ 1.2 in.)



Periodic Maintenance Procedures

Drive Chain Slack Adjustment



- Remove the cotter pin [A], and loosen the axle nut [B].
- Loosen the both chain adjuster locknuts [C].

★If the chain is too loose, turn out the left and right chain adjusters [D] evenly.

★If the chain is too tight, turn in the left and right chain adjusters evenly, and kick the wheel forward.

- Turn both chain adjusters evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [E] on the right wheel alignment indicator [F] should align with the same swingarm mark or position [G] that the left indicator notch aligns with.

⚠ WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

- Tighten both chain adjuster locknuts securely.
- Tighten:

Torque - Rear Axle Nut: 98 N·m (10.0 kgf·m, 72 ft·lb)

- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

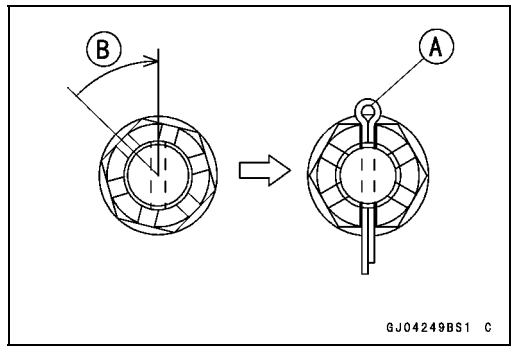
- Insert a new cotter pin [A].

NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*

○*It should be within 30 degrees.*

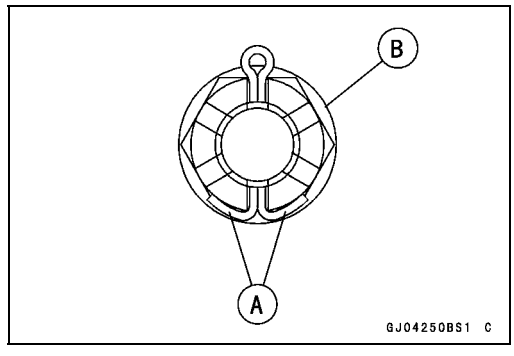
○*Loosen once and tighten again when the slot goes past the nearest hole.*



- Bend the cotter pin [A] over the nut [B].

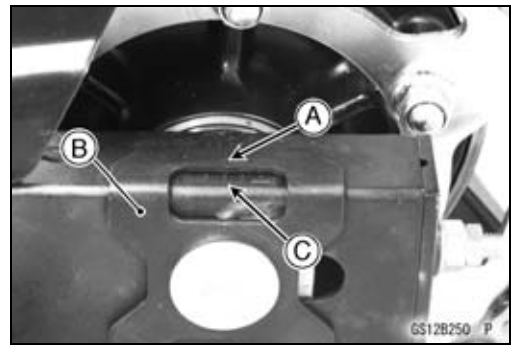
⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.



Periodic Maintenance Procedures

Wheel Alignment Inspection



- Check that the notch [A] on the left alignment indicator [B] aligns with the same swingarm mark or position [C] that the right alignment indicator notch aligns with.

★If they do not, adjust the chain slack and align the wheel alignment (see Drive Chain Slack Adjustment).

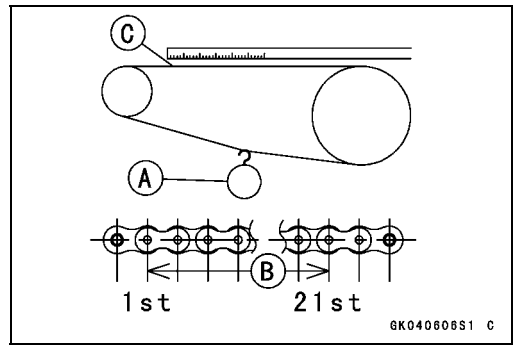
NOTE

○*Wheel alignment can be also checked using the straightedge or string method.*

⚠ WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

Drive Chain Wear Inspection



- Remove the chain cover (see Drive Chain Removal in the Final Drive chapter).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.

★If there is any irregularity, replace the drive chain.

★Lubricate the drive chain if it appears dry.

- Stretch the chain taut by hanging a 10 kg (22 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.

★If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.

Drive Chain 20-link Length

Standard:	**317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)**
Service Limit:	**319 mm (12.56 in.)**

⚠ WARNING

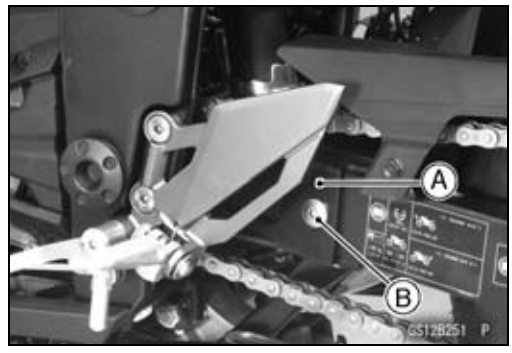
A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with the standard chain. It is an endless type and should not be cut for installation.

Standard Chain

Make:	**ENUMA**
	L.G.B. (when shipping)
	DAIDO (when shipping) (BR Model)
Type:	**EK520SRO**
	R520HPXR (when shipping)
	DID 520VD2 (when shipping) (BR Model)
Link:	**106 links**

Periodic Maintenance Procedures

Chain Guide Wear Inspection



● Visually inspect the chain guide [A].

★ If it shows any signs of abnormal wear or damage, replace the chain guide by removing the bolt [B].

Periodic Maintenance Procedures

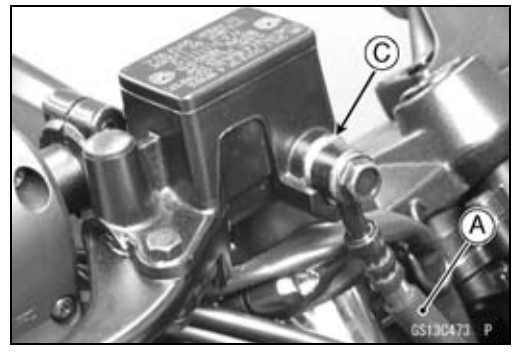
Brakes

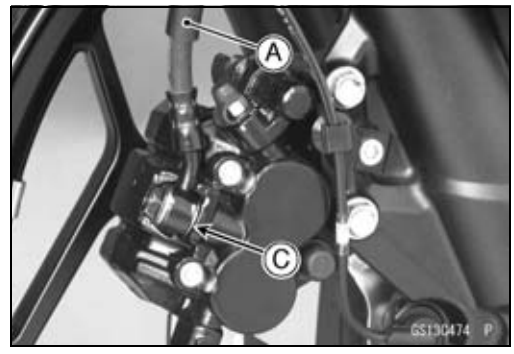
Brake System

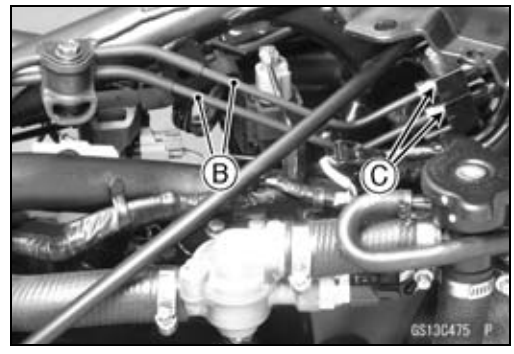
Brake Fluid Leak (Brake Hose and Pipe) Inspection

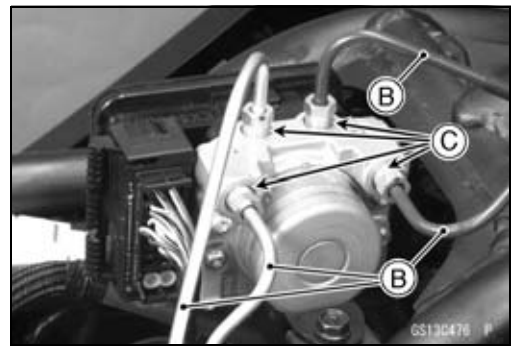
- For models equipped with an ABS, remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], pipes (ABS equipped models) [B] and fittings [C].

★If the brake fluid leaked from any position, inspect or replace the problem part.



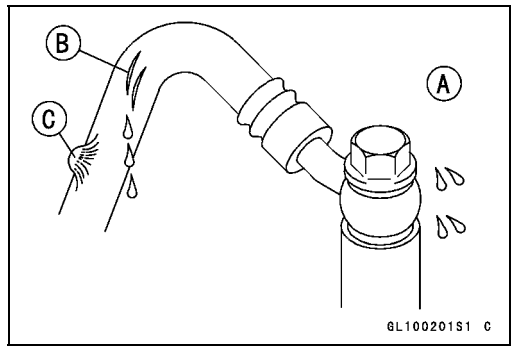






Periodic Maintenance Procedures

Brake Hose and Pipe Damage and Installation Condition Inspection



- For models equipped with an ABS, remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Inspect the brake hoses and fittings for deterioration, cracks and signs of leakage.

○The high pressure inside the brake line can cause fluid to leak [A] or the hose, pipe (ABS equipped models) to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace the hose and pipe (ABS equipped models) if any crack [B], bulge [C] or leakage is noticed.

★Tighten any brake hose banjo bolts and brake pipe joint nuts.

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb) (ABS Equipped Models)

- Inspect the brake hose routing.

★If any brake hose and pipe (ABS equipped models) routing is incorrect, route the brake hose according to Cable, Wire, and Hose Routing section in the Appendix chapter.

Brake Operation Inspection

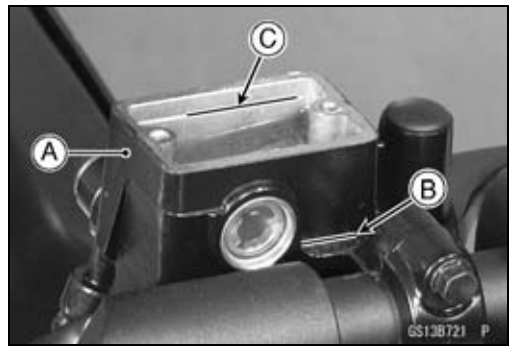
- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★If the brake operation is insufficiency, inspect the brake system.

⚠ WARNING

When test riding the vehicle, be aware of surrounding traffic for your safety.

Brake Fluid Level Inspection



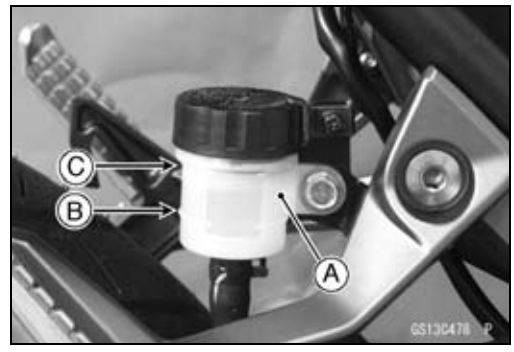
- Check that the brake fluid level in the front brake reservoir [A] is above the lower level line [B].

NOTE

○*Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.*

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C] in the reservoir.

Periodic Maintenance Procedures



- Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].

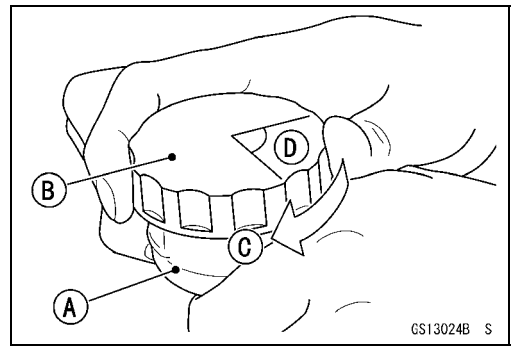
★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].

⚠ WARNING

Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.

Recommended Disc Brake Fluid
Grade:

Front	**DOT3 or DOT4**
Rear	**DOT4**



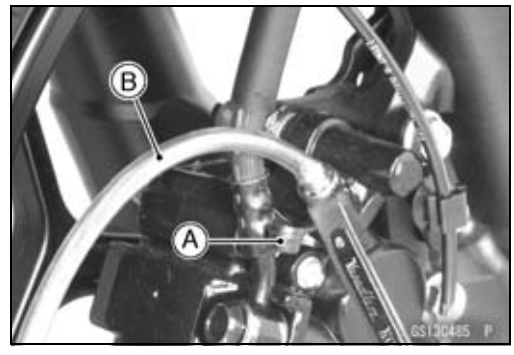
- Follow procedure below to install the rear brake fluid reservoir cap correctly.

○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].

Brake Fluid Change

NOTE

○*The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.*



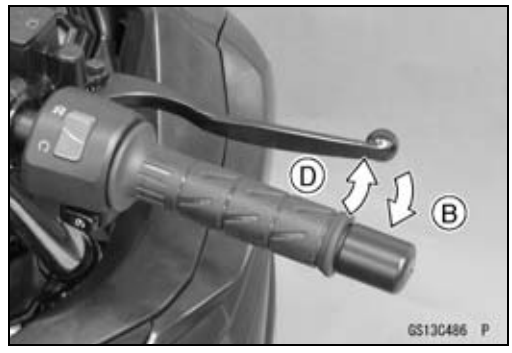
- Level the brake fluid reservoir.
- Remove the reservoir cap and diaphragm.
- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.

Periodic Maintenance Procedures

● Change the brake fluid.

○Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

1. Open the bleed valve [A].
2. Apply the brake and hold it [B].
3. Close the bleed valve [C].
4. Release the brake [D].



NOTE

○*The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

● Remove the clear plastic hose.

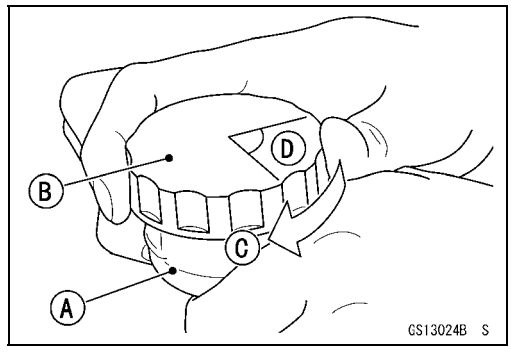
● Install the diaphragm and reservoir cap.

● Tighten:

Torque - Front Brake Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

● Follow the procedure below to install the rear brake fluid reservoir cap correctly.

○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].



● Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

● After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

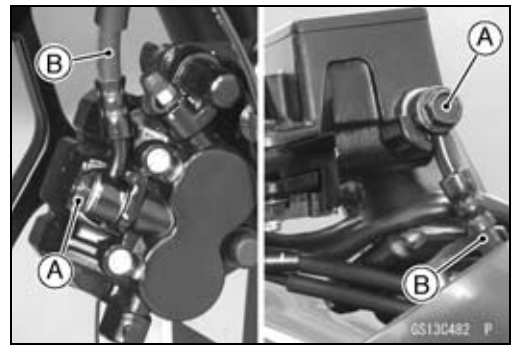
★If necessary, bleed the air from the lines.

Periodic Maintenance Procedures

Brake Hose and Pipe Replacement

NOTICE

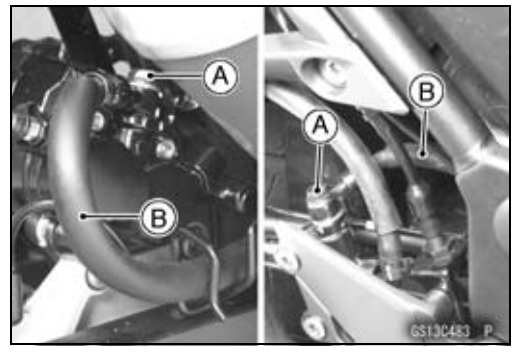
Brake fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.



- Remove the brake hose banjo bolts [A].
- Remove the brake hoses [B], noting the following.

○Take care not to spill the brake fluid on the painted or plastic parts.

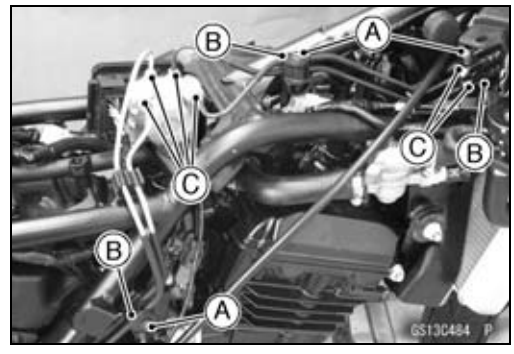
○Temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.



- For models equipped with an ABS, note the following.

NOTE

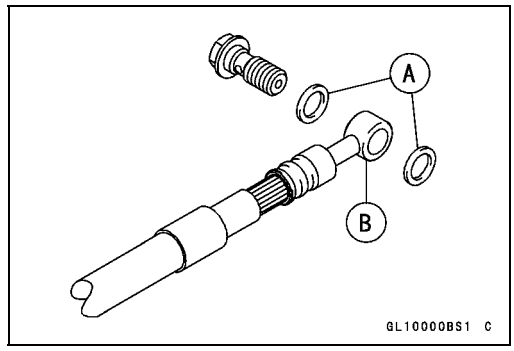
○*When removing the brake pipes and hoses on the hydraulic unit, remove them according to each assembly of the exploded view in the Brakes chapter.*



- Remove:

Right Middle Fairing (see Middle Side Fairing Removal in the Frame chapter)
Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
Bracket Bolts [A]
Brackets [B]
Brake Pipe Joint Nuts [C]

Periodic Maintenance Procedures



- Install the brake hose, noting the following.

○Replace the washers [A] on each side of hose fitting [B] with new ones.

○Avoid sharp bending, kinking, flattening or twisting, and route the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.

- Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.

★If there is any damage, replace the damaged parts with new ones.

NOTE

○*Tighten the brake pipe joint nuts at both ends of the brake pipe temporarily and then tighten them to the specified torque.*

- Install the brake pipes at the specified angle (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten the brake pipe joint nuts with the flare nut wrench.
- Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Pipe Joint Nuts (ABS Equipped Models): 18 N·m (1.8 kgf·m, 13 ft·lb)

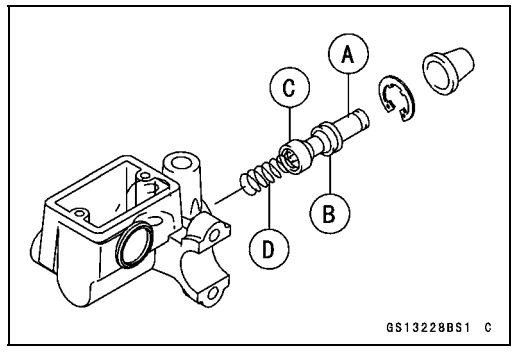
- Fill the brake line (see Brake Fluid Change).

Master Cylinder Rubber Parts Replacement

Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Remove the reservoir cap and diaphragm, and pour the brake fluid into a container.
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Pull the dust cover out of place, and remove the circlip.

Special Tool - Inside Circlip Pliers: 57001-143



- Remove the piston [A], secondary cup [B], primary cup [C] and return spring [D].

NOTICE

Do not remove the secondary cup from the piston since removal will damage it.

Periodic Maintenance Procedures

Rear Master Cylinder Disassembly

NOTE

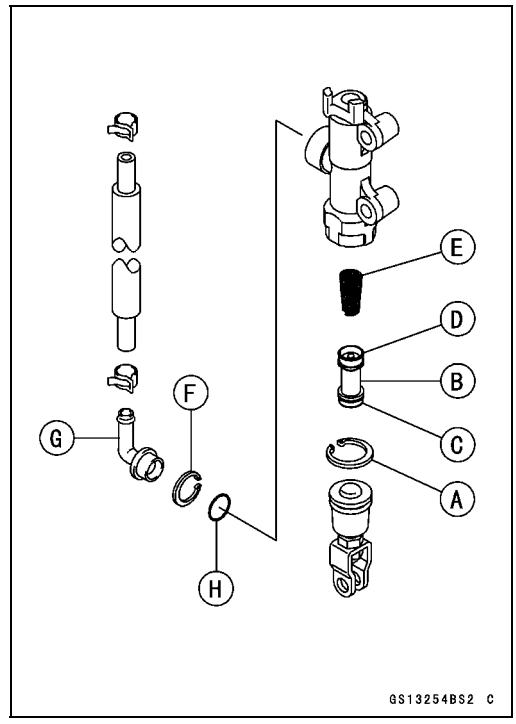
○*Do not remove the push rod clevis for master cylinder disassembly since removal requires brake position adjustment.*

- Remove the rear master cylinder (see Rear Master Cylinder Removal in the Brakes chapter).
- Remove the circlip [A].

Special Tool - Inside Circlip Pliers: 57001-143

- Remove the push rod with the piston stop.
- Take off the piston [B], secondary cup [C], primary cup [D] and return spring [E].
- Remove the circlip [F] and pull out the brake hose connector [G] and O-ring [H].

Special Tool - Inside Circlip Pliers: 57001-143



NOTICE

Do not remove the secondary cup from the piston since removal will damage it.

Master Cylinder Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

NOTICE

Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the brake lever pivot bolt and push rod.
- Tighten:

Torque - Brake Lever Pivot Bolt: 5.9 N·m (0.60 kgf·m, 52 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Periodic Maintenance Procedures

Caliper Rubber Parts Replacement

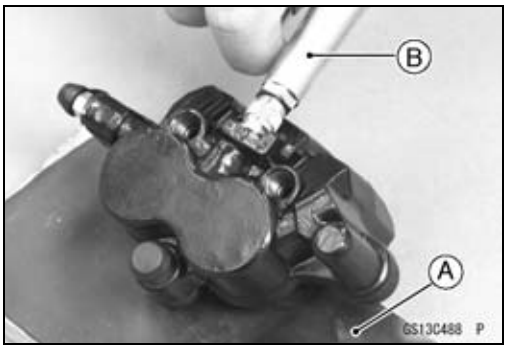
NOTE

○*The procedure to assembly/disassembly the front caliper is as follows. Assembling/disassembling the rear caliper is the same as for the front caliper.*

Caliper Disassembly

● Remove:
Front/Rear Caliper (see Front/Rear Caliper Removal in the Brakes chapter)
Brake Pads (see Brake Pad Removal in the Brakes chapter)
Pad Spring

● Using compressed air, remove the pistons.
○Cover the piston area with a clean, thick cloth [A].
○Blow compressed air [B] into the hole for the banjo bolt to remove the piston.



⚠ WARNING

The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

● Remove the pistons by hand.
● Remove:
Caliper Holder
Dust Seals
Fluid Seals
Bleed Valve
Rubber Cap

NOTE

○*If compressed air is not available, do as follows with the brake hose connected to the caliper.*
○*Prepare a container for brake fluid, and perform the work above it.*
○*Remove the pads (see Brake Pad Removal in the Brakes chapter).*
○*Pump the brake lever until the pistons come out of the cylinders, and then disassemble the caliper.*

Caliper Assembly

● Clean the caliper parts except for the pads.

NOTICE

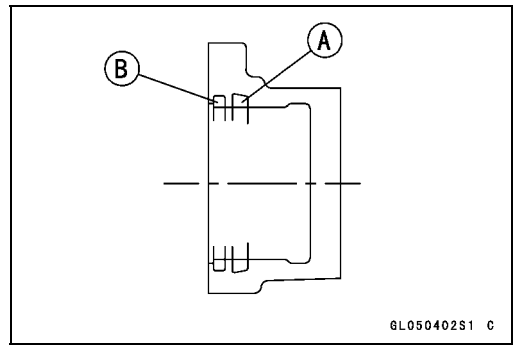
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

● Install the bleed valve and rubber cap.

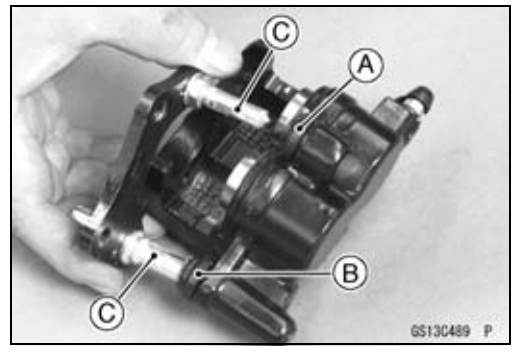
Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

Periodic Maintenance Procedures

- Apply brake fluid to the cylinder bores.
- Replace the fluid seals [A] with new ones.
- ○Apply silicone grease to the fluid seals, and install them into the cylinders by hand.
- Replace the dust seals [B] with new ones.



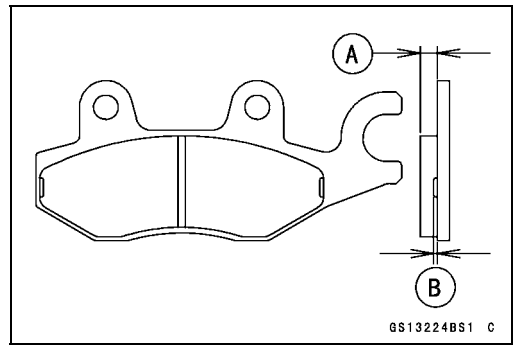
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the dust cover [A] and the friction boot [B] replace them with new ones if they are damaged.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder pin bolts [C] (PBC is a special high -temperature, water-resistance grease).
- Install the caliper holder and pad spring.



- Install the pads (see Brake Pad Installation in the Brakes chapter).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

Brake Pad Wear Inspection

- Remove the brake pads (see Brake Pad Removal in the Brakes chapter).
- Check the lining thickness [A] of the pads in each caliper.
- ★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.



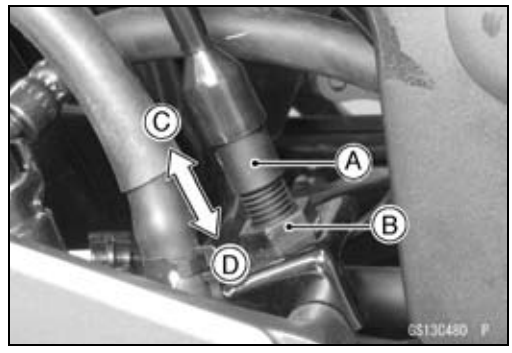
Pad Lining Thickness

Standard:	
Front	**4.5 mm (0.18 in.)**
Rear	**4.5 mm (0.18 in.)**
Service Limit:	
Front	**1.5 mm (0.06 in.)**
	1 mm (0.04 in.) (ABS Equipped Models)
Rear	**1.5 mm (0.06 in.)**

Brake Light Switch Operation Inspection

- Turn on the ignition switch.
- The brake light [A] should go on when the brake lever is applied or after the brake pedal is depressed about 10 mm (0.39 in.).

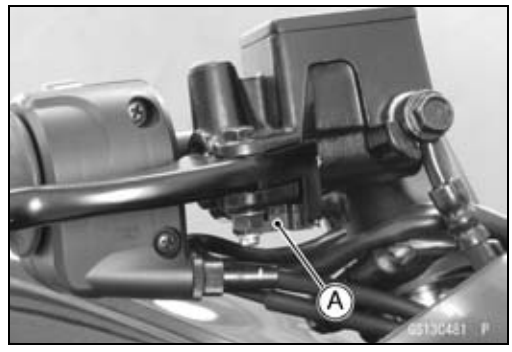
★If it does not, adjust the brake light switch.
● While holding the switch body, turn the adjusting nut to adjust the switch.
Switch Body [A]
Adjusting Nut [B]
Light sooner as the body rises [C]
Light later as the body lowers [D]



NOTICE

To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

★If it does not go on, inspect or replace the following items.
Battery (see Charging Condition Inspection in the Electrical System chapter)
Brake Light (see Tail/Brake Light Removal in the Electrical System chapter)
Main Fuse 30 A and Taillight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)



Suspension

Suspension System

Front Forks/Rear Shock Absorber Operation Inspection

● Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.
★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).

● Pump the seat down and up [A] 4 or 5 times, and inspect the smooth stroke.
★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak (see Rear Shock Absorber Oil Leak Inspection).

Periodic Maintenance Procedures

Front Fork Oil Leak Inspection

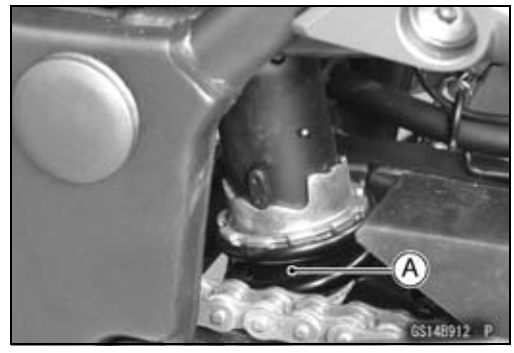
- Visually inspect the front forks [A] for oil leakage.

★Replace any defective parts, if necessary.

Rear Shock Absorber Oil Leak Inspection

- Visually inspect the shock absorber [A] for oil leakage.

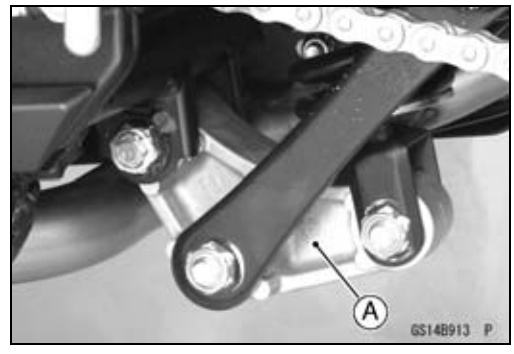
★If the oil leakage is found on it, replace the shock absorber with a new one.



Rocker Arm Operation Inspection

- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

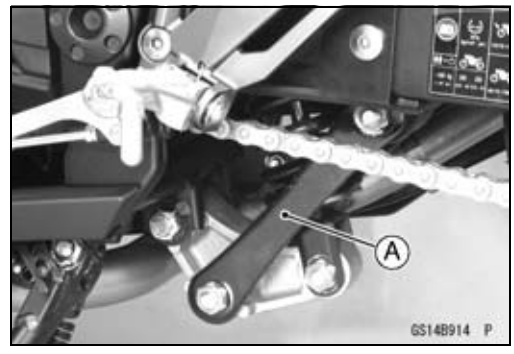
★If the rocker arm [A] does not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).



Tie-Rod Operation Inspection

- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

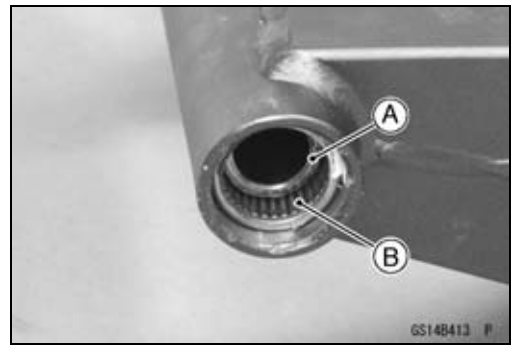
★If the tie-rods [A] do not smoothly stroke or noise is found, inspect the fasteners and tie-rod bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).



Lubrication of Rear Suspension

Swingarm Pivot Lubrication

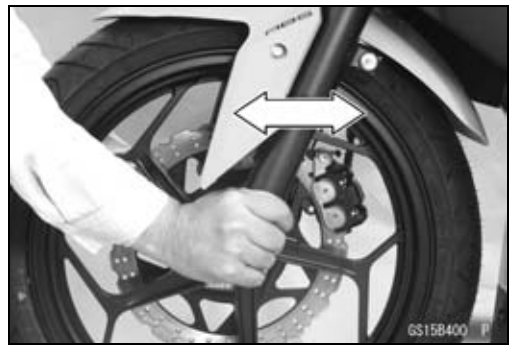
- Remove:
  Swingarm (see Swingarm Removal in the Suspension chapter)
  Sleeve [A]
- Using a high flash-point solvent, clean the old grease out of the needle bearings [B].
- Apply plenty of grease to the inner surface of the needle bearings.
- Apply thin coat of grease to the lips of the oil seals.
- Install the swingarm (see Swingarm Installation in the Suspension chapter).



Periodic Maintenance Procedures

Steering

Steering Play Inspection



- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the front wheel off the ground with the jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.

★If the wheel binds or catches before the stop, the steering is too tight.

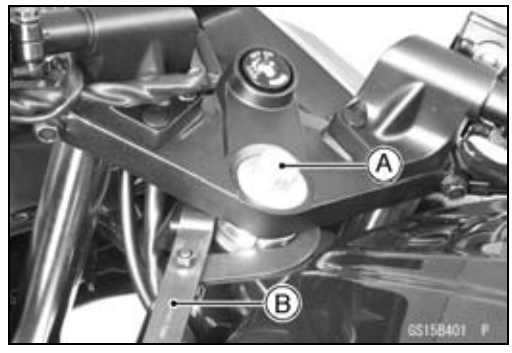
- Feel for steering looseness by pushing and pulling the forks.

★If you feel looseness, the steering is too loose.

NOTE

○*The cables and wiring will have some effect on the motion of the fork which must be taken into account.*
○*Be sure the leads and cables are properly routed.*
○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

Steering Play Adjustment



- Loosen:
  Front Fork Lower Clamp Bolts (Both Sides)
  Stem Head Bolt [A]
- Adjust the steering.

Special Tool - Steering Stem Nut Wrench [B]: 57001-1100

★If the steering is too tight, loosen the stem nut a fraction of a turn.

★If the steering is too loose, tighten the stem nut a fraction of a turn.

NOTE

○*Turn the stem nut 1/8 turn at time maximum.*

- Tighten:

Torque - Steering Stem Head Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)
Front Fork Lower Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)

- Check the steering again.

★If the steering is still too tight or too loose, repeat the adjustment.

Periodic Maintenance Procedures

Steering Stem Bearing Lubrication

- Remove the steering stem (see Stem, Stem Bearing Removal in the Steering chapter).
- Using a high flash-point solvent, wash the upper and lower [A] ball bearings, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the ball bearings.

★Replace them if they show wear or damage.

- Apply a light coat of grease to the upper and lower ball bearings and outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).

Periodic Maintenance Procedures

Electrical System

Lights and Switches Operation Inspection

First Step

- Set the gear position in the neutral position.
- Turn the ignition switch on.
- The following lights should go on according to the table below.

City Lights [A]	goes on
Taillight [B]	goes on
License Plate Light [C]	goes on
Green Turn Signal Indicator Light (LED) [D]	goes on (about 2 seconds)
Red Battery Voltage Warning Indicator Light (LED) [E]	goes on (about 2 seconds)
Red Oil Pressure Warning Indicator Light (LED) [F]	goes on
Meter Panel Illumination Light (LED) [G]	goes on
Red Water Temperature Warning Indicator Light (LED) [H]	goes on (about 2 seconds)
Yellow Engine Warning Indicator Light (LED) [I]	goes on (about 2 seconds)
Yellow ABS Indicator Light (LED) [J] (ABS Equipped Models)	goes on
Blue High Beam Indicator Light (LED) [K]	goes on (about 2 seconds)
Meter Panel LCD [L]	goes on
Green Neutral Indicator Light (LED) [M]	goes on

★If the light does not go on, inspect or replace the following item:

Battery (see Charging Condition Inspection in the Electrical System chapter)

Main Fuse 30 A, Meter Fuse 10 A and Headlight Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

Applicable Bulb (see Wiring Diagram in the Electrical System chapter)

Meter Unit for Meter Panel LCD (see Meter Unit Inspection in the Electrical System chapter)

Meter Unit for Illumination Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

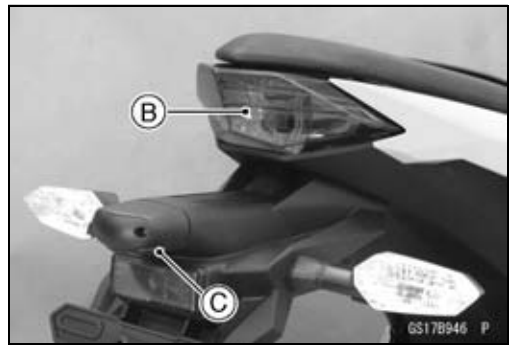
Meter Unit for Yellow Engine Warning Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

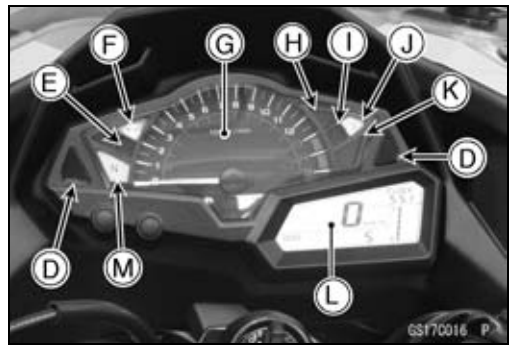
Meter Unit for Red Battery Voltage Warning Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

Meter Unit for Green Neutral Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

Meter Unit for Red Oil Pressure Warning Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

Meter Unit for Red Water Temperature Warning Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)





Periodic Maintenance Procedures

Meter Unit for Blue High Beam Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)
Ignition Switch (see Switch Inspection in the Electrical System chapter)
Neutral Switch (see Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)
Yellow ABS Indicator Light (LED) (ABS Equipped Models) (see Yellow ABS Indicator Light (LED) Inspection in the Brakes chapter)

- Turn the ignition switch off.
- The all lights should go off.

★If any light does not go off, replace the ignition switch.

Second Step

- Turn the ignition switch on.
- Turn on the turn signal switch [A] (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
- The green turn signal indicator light (LED) [C] in the meter unit should blink.

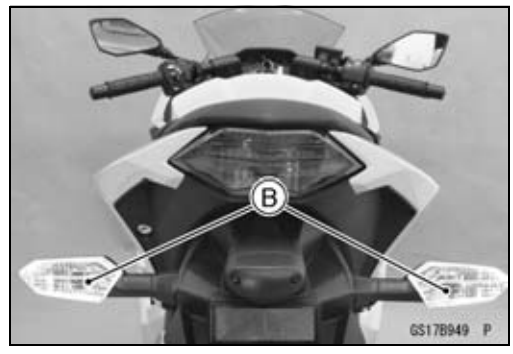
★If the each light does not blink, inspect or replace the following item.

Turn Signal Light Bulb (see Turn Signal Light Bulb Replacement in the Electrical System chapter)
Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light (LED) should go off.

★If the light does not go off, inspect or replace the following item.

Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)

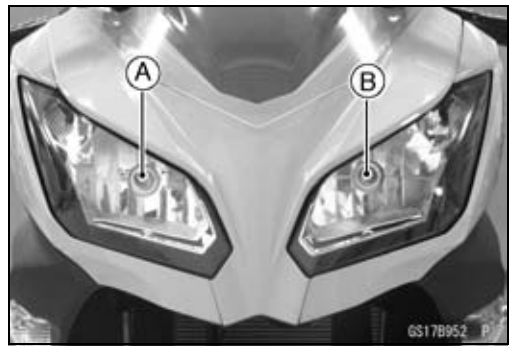


Periodic Maintenance Procedures

Third Step

- Set the dimmer switch [A] to low beam position.
- Start the engine.
- The low beam headlight should go on.

★If the low beam headlight does not go on, inspect or replace the following item.
Headlight Low Beam Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
Headlight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Dimmer Switch (see Switch Inspection in the Electrical System chapter)
Headlight Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)



- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The blue high beam indicator light (LED) [C] should go on.

★If the high beam headlight and/or blue high beam indicator light (LED) does not go on, inspect or replace the following item.
Headlight High Beam Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
Dimmer Switch (see Switch Inspection in the Electrical System chapter)

- Turn the engine stop switch to stop position.
- The low beam and high beam headlights should stay going on.

★If the headlights and blue high beam indicator light (LED) does go off, inspect or replace the following item.
Headlight Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)

- Turn the ignition switch to off.
- The headlights and blue high beam indicator light (LED) should go off.

Headlight Aiming Inspection

- Inspect the headlight beam for aiming.

★If the headlight beam points to one side rather than straight ahead, adjust the horizontal beam.

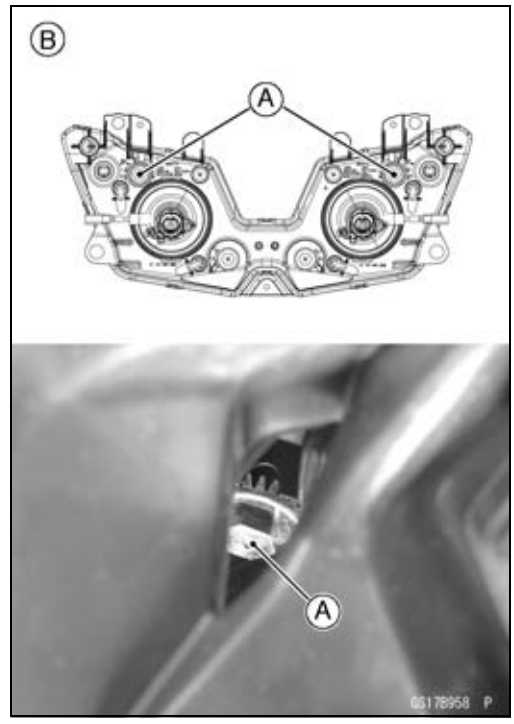
Periodic Maintenance Procedures

Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster [A] on the headlight in or out until the beam points straight ahead.

★If the headlight beam points too low or high, adjust the vertical beam.

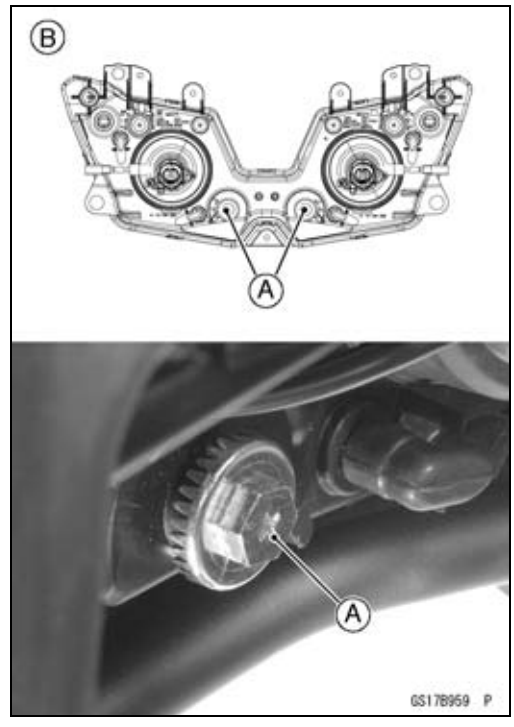
[B] Viewed from Rear



Headlight Beam Vertical Adjustment

- Turn the vertical adjuster [A] on the headlight in or out to adjust the headlight vertically.

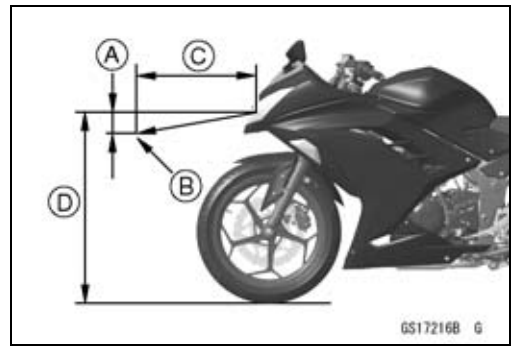
[B] Viewed from Rear



NOTE

○*ON high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*

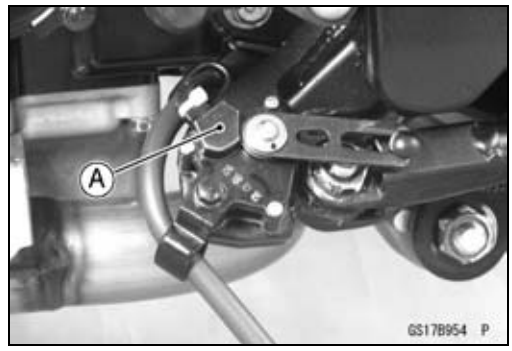
○*For US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.*



50 mm (2 in.) [A]
Center of Brightest Spot [B]
7.6 m (25 ft) [C]
Height of Headlight Center [D]

Periodic Maintenance Procedures

Sidestand Switch Operation Inspection



- Inspect the sidestand switch [A] operation accordance to the following table.

Sidestand Switch Operation

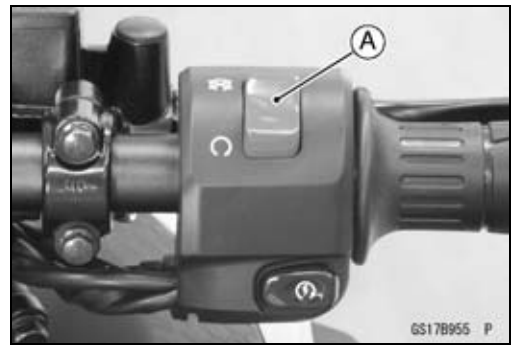
Sidestand	Gear Position	Clutch Lever	Engine Start	Engine Run
Up	Neutral	Released	Starts	Continue running
Up	Neutral	Pulled in	Starts	Continue running
Up	In Gear	Released	Doesn't start	Continue running
Up	In Gear	Pulled in	Starts	Continue running
Down	Neutral	Released	Starts	Continue running
Down	Neutral	Pulled in	Starts	Continue running
Down	In Gear	Released	Doesn't start	Stops
Down	In Gear	Pulled in	Doesn't start	Stops

★If the sidestand switch operation does not work, inspect or replace the following item:
Battery (see Charging Condition Inspection in the Electrical System chapter)
Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
Ignition Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Ignition Switch (see Switch Inspection in the Electrical System chapter)
Sidestand Switch (see Switch Inspection in the Electrical System chapter)
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)
Starter Button (see Switch Inspection in the Electrical System chapter)
Neutral Switch (see Switch Inspection in the Electrical System chapter)
Starter Lockout Switch (see Switch Inspection in the Electrical System chapter)
Starter Relay (see Starter Relay Inspection in the Electrical System chapter)
Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Starter Circuit Relay (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

★If the all parts are good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Periodic Maintenance Procedures

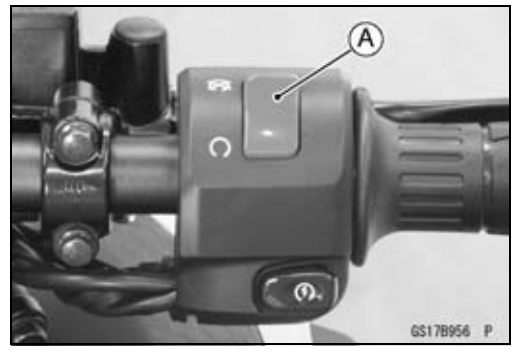
Engine Stop Switch Operation Inspection



First Step

- Turn the ignition switch on.
- Set the neutral position.
- Turn the engine stop switch to stop position [A].
- Push the starter button.
- The engine does not start.

★If the engine starts, inspect or replace the following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)



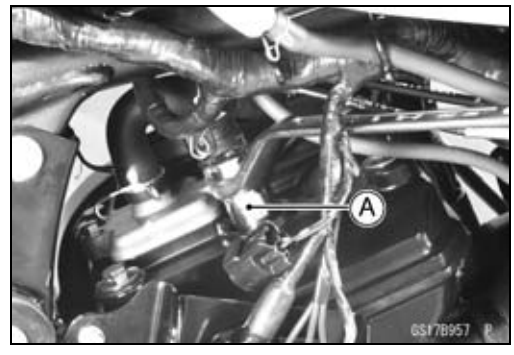
Second Step

- Turn the ignition switch on.
- Set the neutral position.
- Turn the engine stop switch to run position [A].
- Push the starter button and run the engine.
- Turn the engine stop switch to stop position.
- Immediately the engine should be stop.

★If the engine does not stop, inspect or replace the following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)

★If the engine stop switch is good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Spark Plug Replacement



- Remove the stick coils (see Stick Coil Removal in the Electrical System chapter).
- Remove the spark plugs using the 16 mm (0.63 in.) plug wrench [A] vertically.
- Replace the spark plug with a new one.

Standard Spark Plug
Type: NGK CR8E

- Insert the spark plug vertically into the spark plug hole with the spark plug installed in the plug wrench, and finger -tighten it first.

NOTICE

The insulator of the spark plug may break if when the wrench is inclined during tightening.

- Tighten:

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

- Install the stick coils properly (see Stick Coil Installation in the Electrical System chapter).

○Be sure the stick coils are installed by pulling up it lightly.

NOTE

○*Be careful not to tight the stick coil leads.*

Periodic Maintenance Procedures

Others

Chassis Parts Lubrication

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

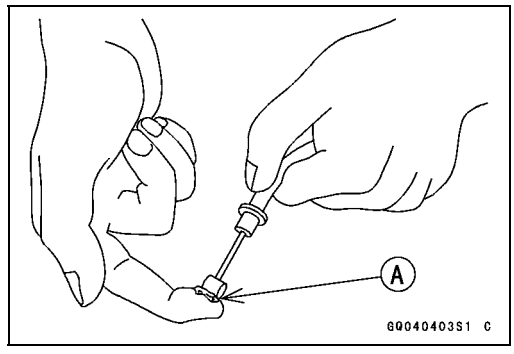
○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Grease.

Brake Lever
Brake Pedal
Clutch Lever
Rear Brake Joint Pin
Sidestand

Points: Lubricate with Grease.

Clutch Inner Cable Upper and Lower Ends [A]
Throttle Inner Cable Upper and Lower Ends

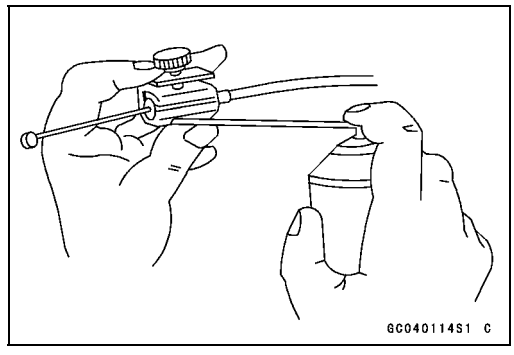


Cables: Lubricate with Rust Inhibitor.

Clutch Cable
Throttle Cables

- Lubricate the cables by seeping the oil between the cable and housing.

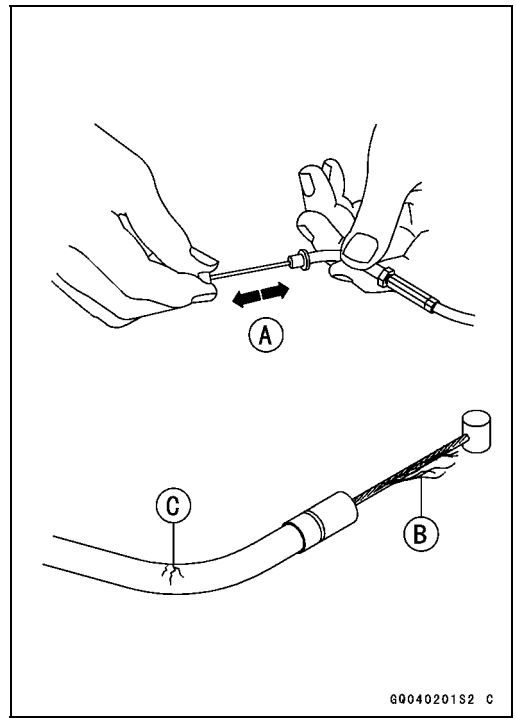
○The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.



Periodic Maintenance Procedures

- With the cable disconnected at both ends, the cable should move freely [A] within the cable housing.

★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



Periodic Maintenance Procedures

Condition of Bolts, Nuts and Fasteners Tightness Inspection

● Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○*For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★If there are loose fasteners, retighten them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

Bolt, Nut and Fastener to be checked

Engine:
- Clutch Lever Pivot Bolt Locknut
- Engine Mounting Bracket Bolts and Nuts
- Engine Mounting Nuts
- Exhaust Pipe Holder Nuts
- Exhaust Pipe Mounting Bolt
- Muffler Body Clamp Bolt
- Muffler Body Mounting Bolt
- Radiator Bolts

Wheels:
- Front Axle Nut
- Front Axle Nut Cotter Pin
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Brakes:
- Brake Lever Pivot Bolt Locknut
- Brake Pedal Bolt
- Caliper Mounting Bolts
- Front Master Cylinder Clamp Bolts
- Rear Master Cylinder Mounting Bolts
- Rear Master Cylinder Push Rod Joint Cotter Pin

Suspension:
- Front Fork Clamp Bolts
- Rear Shock Absorber Nuts
- Swingarm Pivot Shaft Nut
- Tie-Rod Nuts
- Uni-Trak Rocker Arm Nut

Steering:
- Handlebar Mounting Bolts
- Steering Stem Head Bolt

Others:
- Footpeg Bracket Bolts
- Sidestand Nut

Fuel System (DFI)

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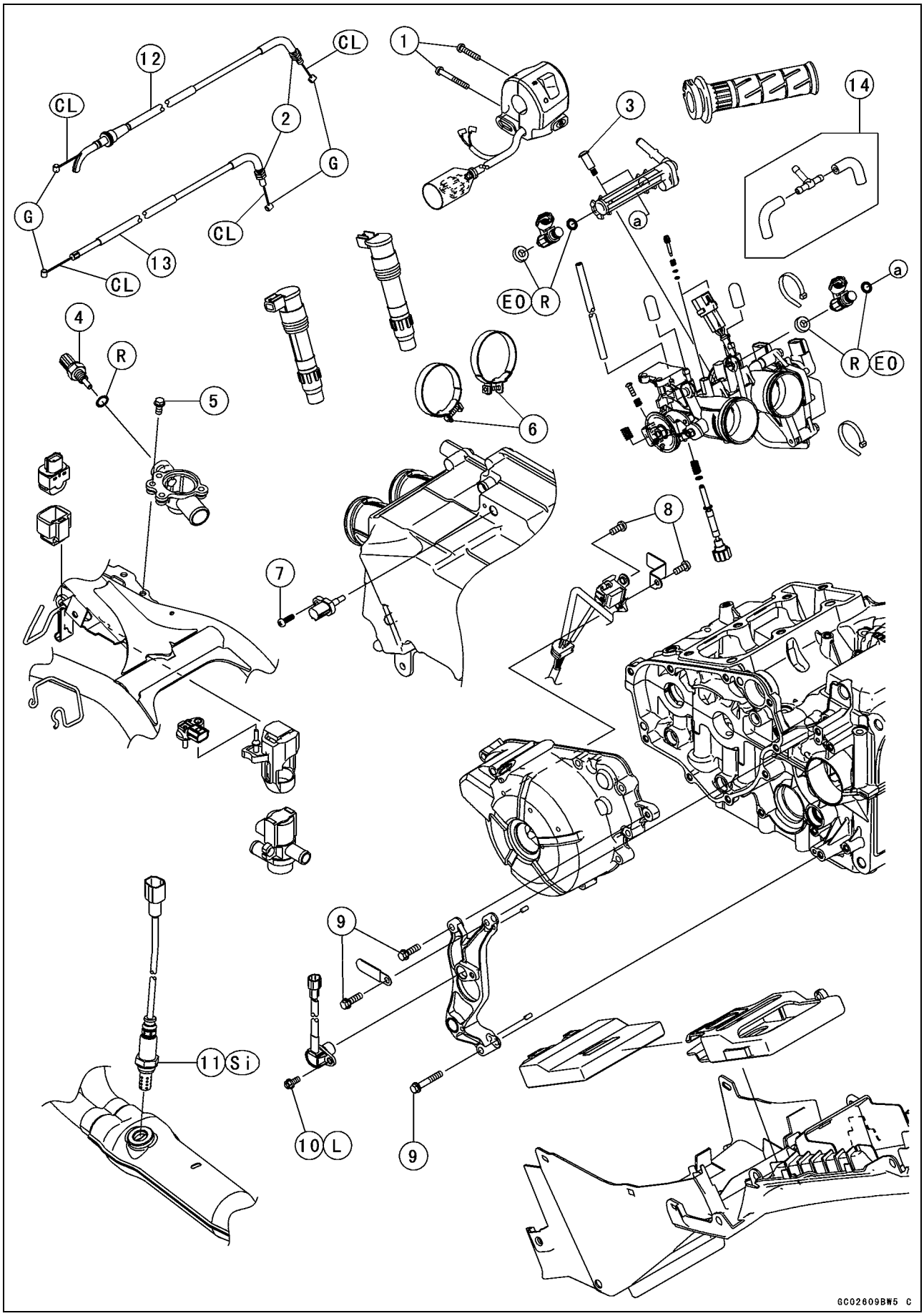
Exploded View



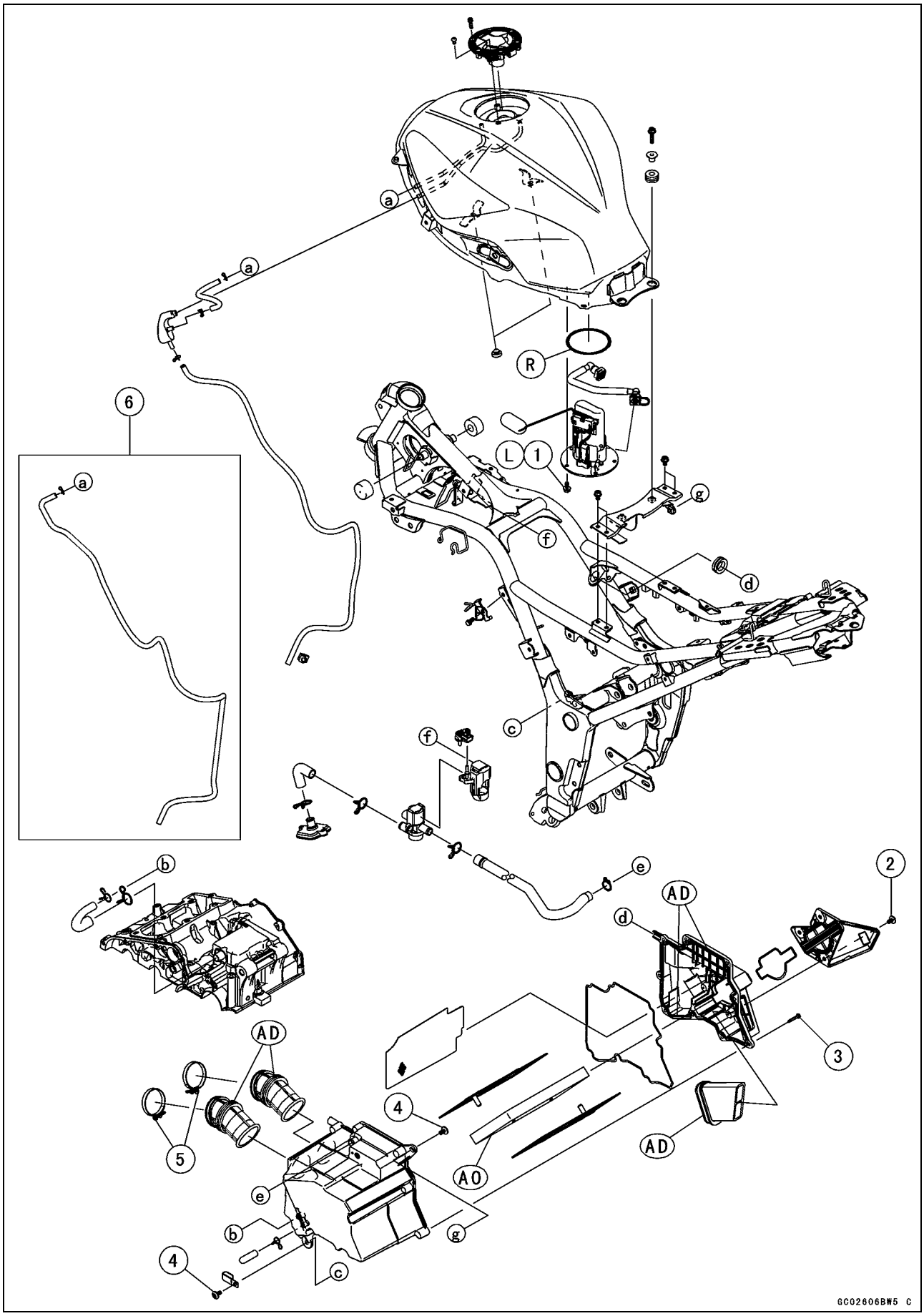
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Switch Housing Screws	3.5	0.36	31 in·lb	
2	Throttle Cable Locknuts	2.8	0.29	25 in·lb	
3	Delivery Pipe Assy Mounting Screws	3.4	0.35	30 in·lb	
4	Water Temperature Sensor	12	1.2	106 in·lb	
5	Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
6	Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
7	Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
8	Crankshaft Sensor Screws	5.2	0.53	46 in·lb	
9	Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
10	Speed Sensor Bolt	7.8	0.80	69 in·lb	L
11	Oxygen Sensor (Equipped Models)	44.1	4.50	32.5	Si

12. Throttle Cable (Accelerator)
13. Throttle Cable (Decelerator)
14. CAL Model

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease (ex. PBC grease).

Exploded View



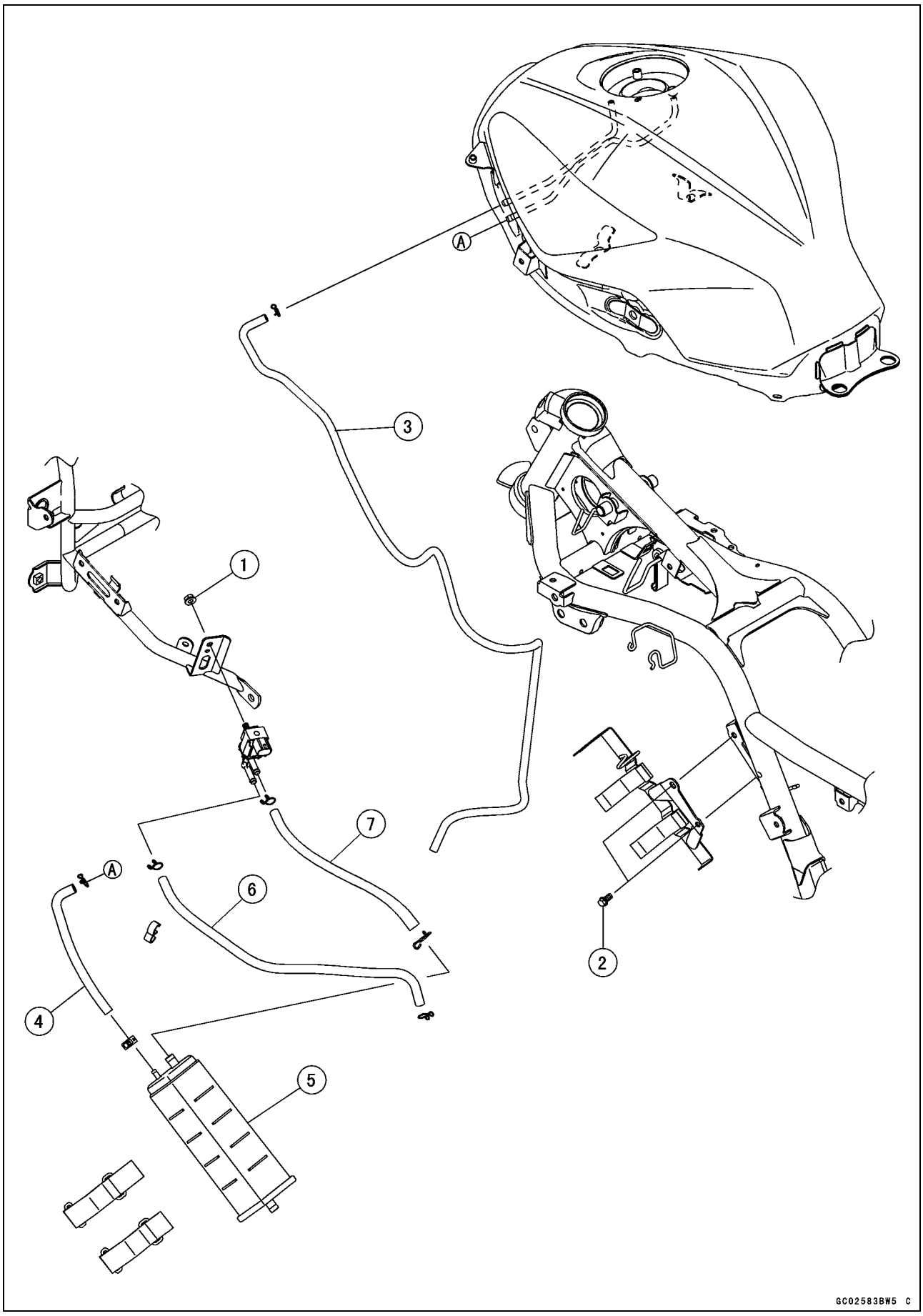
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Pump Bolts	9.8	1.0	87 in·lb	L
2	Air Cleaner Housing Cap Screws	2.5	0.25	22 in·lb	
3	Air Cleaner Housing Screws	1.15	0.117	10 in·lb	
4	Air Cleaner Housing Mounting Bolts	4.0	0.41	35 in·lb	
5	Air Duct Clamp Screws	2.0	0.20	18 in·lb	

6. CAL Model
AD: Apply adhesive.
AO: Apply high-quality-form-air-filter oil.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View

CAL Model



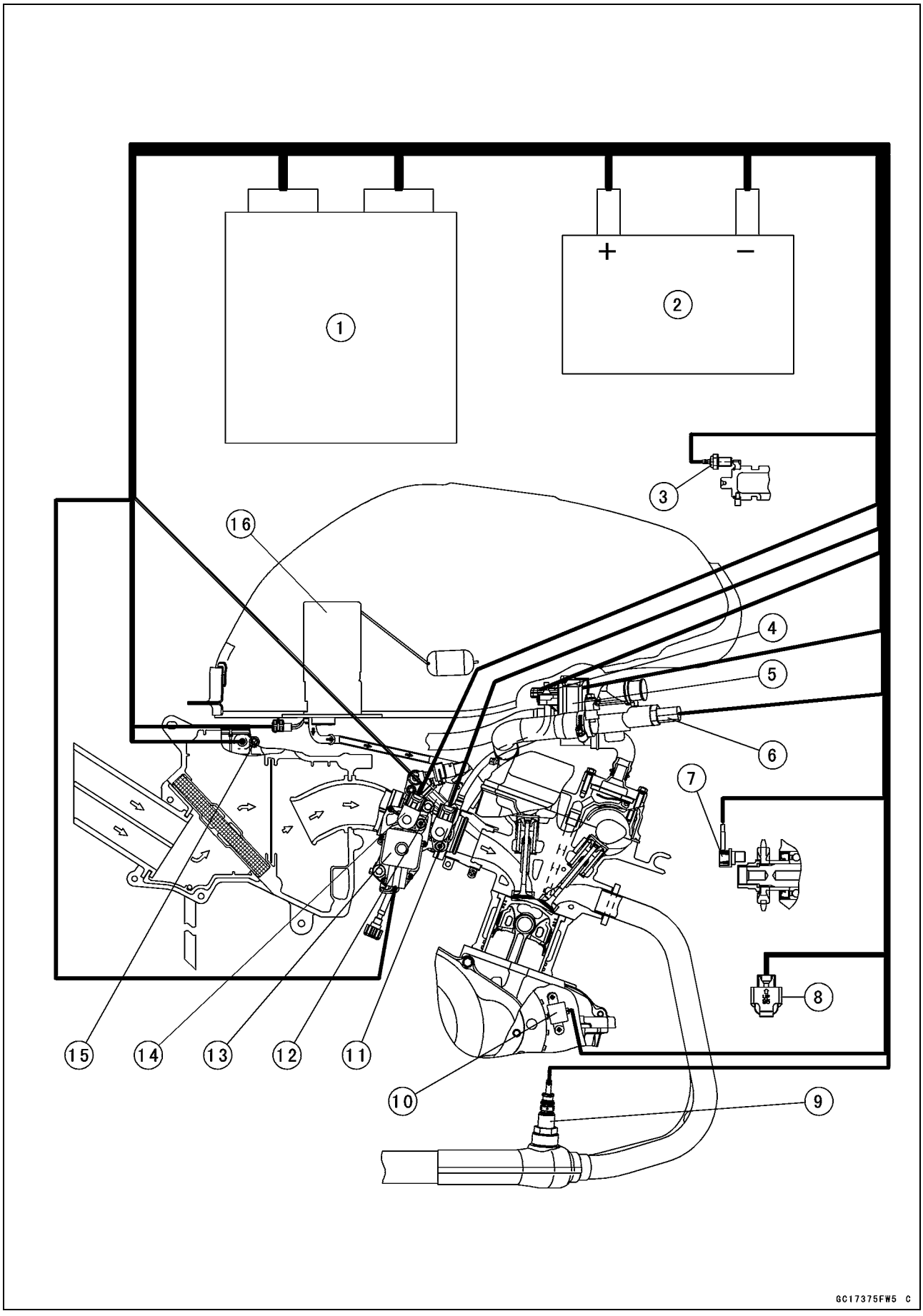
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Purge Valve Mounting Nut	9.8	1.0	87 in·lb	
2	Canister Bracket Bolts	9.8	1.0	87 in·lb	

3. Drain Hose
4. Breather Hose (Blue Mark)
5. Canister
6. Canister Hose (Green Mark) (L = 380 mm, 15.0 in.)
7. Canister Hose (Green Mark) (L = 230 mm, 9.06 in.)

DFI System

DFI System



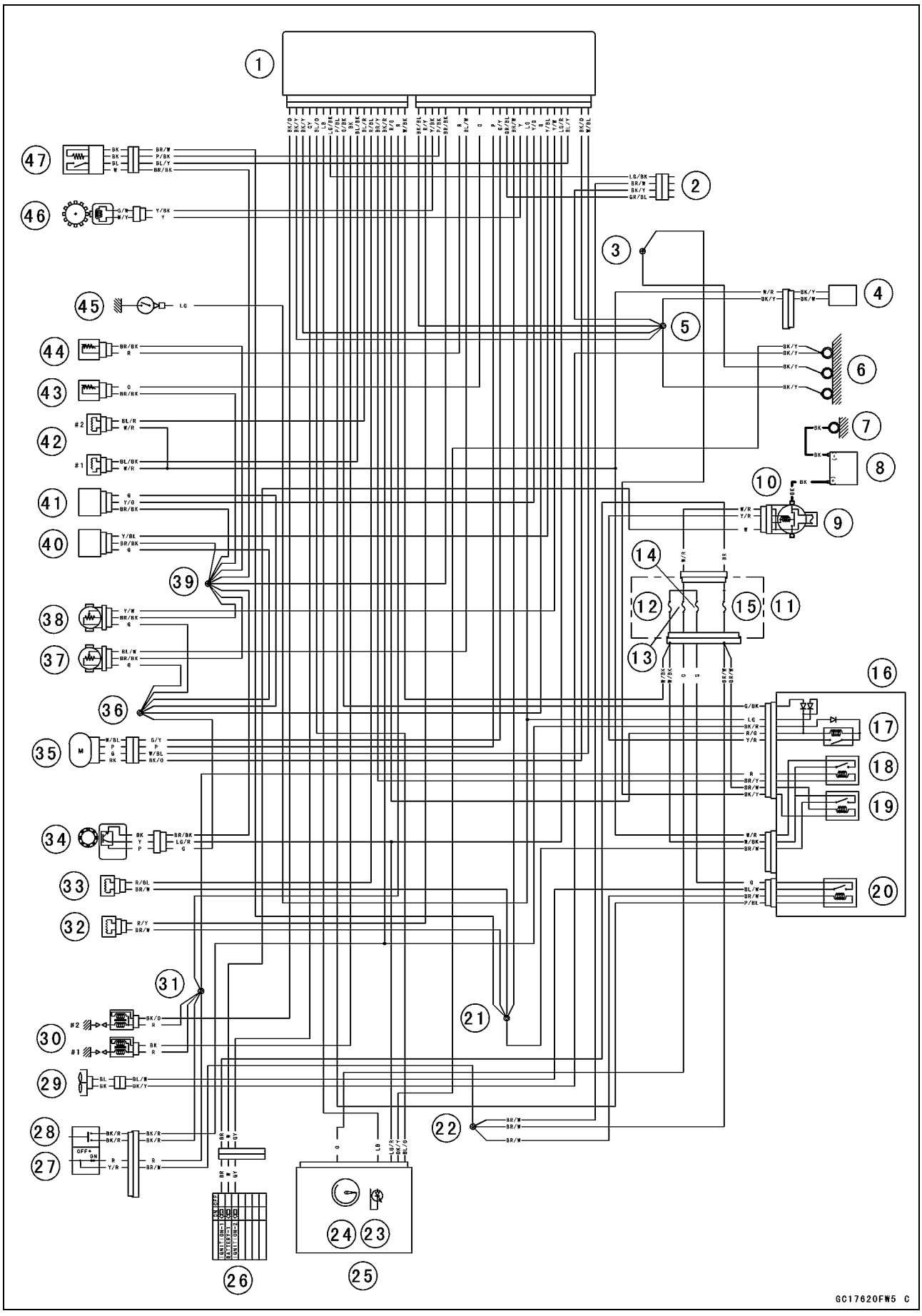
DFI System

1. ECU
2. Battery 12 V 8 Ah
3. Neutral Switch
4. Intake Air Pressure Sensor
5. Air Switching Valve
6. Water Temperature Sensor
7. Speed Sensor
8. Vehicle-down Sensor
9. Oxygen Sensor (Equipped Models)
10. Crankshaft Sensor
11. Main Throttle Sensor
12. Fuel Injectors
13. Subthrottle Valve Actuator
14. Subthrottle Sensor
15. Intake Air Temperature Sensor
16. Fuel Pump

3-12 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram



DFI System

Part Names

1. ECU
2. Kawasaki Diagnostic System Connector
3. Water-proof Joint 1
4. Fuel Pump
5. Water-proof Joint 2
6. Frame Ground
7. Engine Ground
8. Battery 12 V 8 Ah
9. Main Fuse 30 A
10. Starter Relay
11. Fuse Box 1
12. FI Fuse 15 A
13. Meter Fuse 10 A
14. Fan Fuse 10 A
15. Ignition Fuse 10 A
16. Relay Box
17. Starter Circuit Relay
18. Fuel Pump Relay
19. ECU Main Relay
20. Radiator Fan Relay
21. GPS Unit (Equipped Models)
22. Water-proof Joint 7
23. Water-proof Joint 8
24. Yellow Engine Warning Indicator Light (LED)
25. Tachometer
26. Meter Unit
27. Ignition Switch
28. Engine Stop Switch
29. Starter Button
30. Fan Motor
31. Spark Plugs
32. Water-proof Joint 5
33. Parge Valve (CAL Model)
34. Air Switching Valve
35. Speed Sensor
36. Subthrottle Valve Actuator
37. Water-proof Joint 4
38. Subthrottle Sensor
39. Main Throttle Sensor
40. Water-proof Joint 3
41. Intake Air Pressure Sensor
42. Vehicle-down Sensor
43. Fuel Injectors
44. Water Temperature Sensor
45. Intake Air Temperature Sensor
46. Neutral Switch
47. Crankshaft Sensor
48. Oxygen Sensor (Equipped Models)

NOTES:

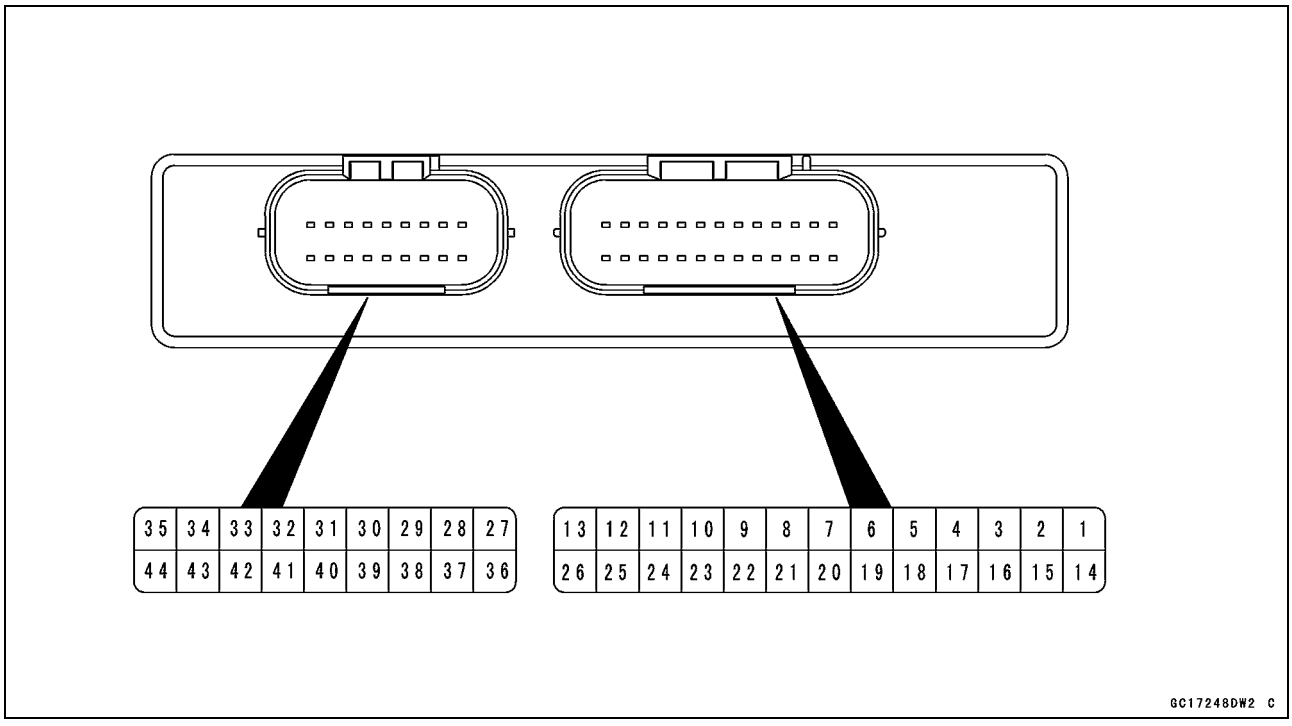
a: BR/BK (GPS Unit Equipped Model)
b: GY/BL Line (GPS Unit Equipped Model)
c: BR/BK (GPS Unit Equipped Model)
d: GY/BL Line (GPS Unit Equipped Model)
e: GY Line (Except GPS Unit Equipped Model)

DFI System

○Color Codes:

BK: Black	GY: Gray	PU: Purple
BL: Blue	LB: Light Blue	R: Red
BR: Brown	LG: Light Green	V: Violet
CH: Chocolate	O: Orange	W: White
DG: Dark Green	P: Pink	Y: Yellow
G: Green		

Terminal Numbers of ECU Connectors



Terminal Names

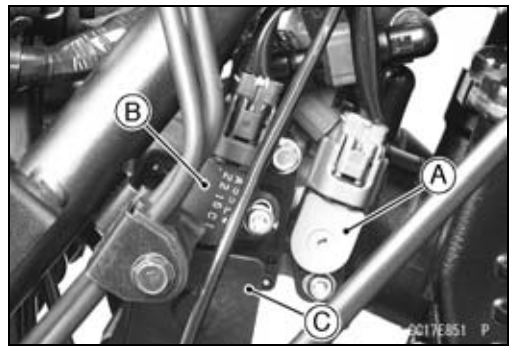
1. Subthrottle Valve Actuator: W/BL
2. Subthrottle Valve Actuator: BK/O
3. Unused
4. Oxygen Sensor (Equipped Models): BL/Y
5. Speed Sensor: LG/R
6. Main Throttle Sensor: Y/W
7. Intake Air Pressure Sensor: Y/BL
8. Power Supply (5 V) to Sensors: G
9. Vehicle-down Sensor: Y/G
10. Neutral Switch: LG
11. Crankshaft Sensor (+): Y
12. Power Supply to ECU (from ECU Main Relay): BR/W
13. External Communication Line: GY/BL
14. Subthrottle Valve Actuator: G/Y
15. Subthrottle Valve Actuator: P
16. Unused
17. Water Temperature Sensor: O
18. Unused
19. Subthrottle Sensor: BL/W
20. Intake Air Temperature Sensor: R
21. Unused
22. Ground for Sensors: BR/BK
23. Oxygen Sensor Heater (Equipped Models): P/BK
24. Crankshaft Sensor (–): Y/BK
25. Evapo Purge Valve (CAL Model): R/Y

DFI System

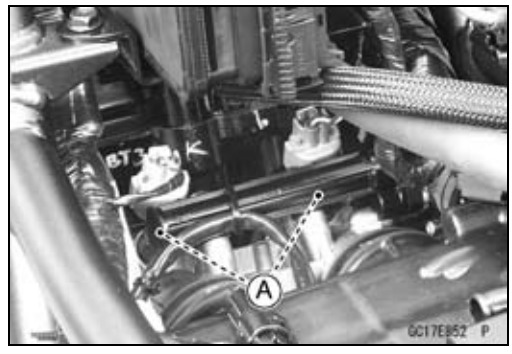
26. Ground for ECU: BK/BL
27. Power Supply to ECU (from Battery): W/BK
28. Engine Stop Switch: R
29. Starter Lockout Switch: R/G
30. Starter Button: BK/R
31. Fuel Pump Relay: BR/Y
32. Air Switching Valve: R/BL
33. Injector #2: BL/R
34. Injector #1: BL/BK
35. Stick Coil #1: BK
36. Sidestand Switch: G/BK
37. Fan Relay: P/BL
38. External Communication Line: LG/BK
39. Meter Unit (Tachometer): LB
40. Meter Unit Communication Line: BL/O
41. –
42. Ground for Fuel System: BK/Y
43. Ground for Ignition System: BK/Y
44. Stick Coil #2: BK/O

DFI Parts Location

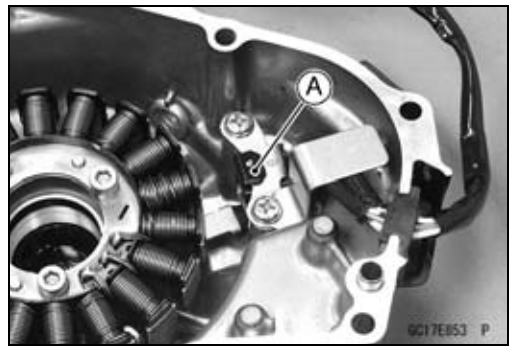
Main Throttle Sensor [A]
Subthrottle Sensor [B]
Subthrottle Valve Actuator [C]



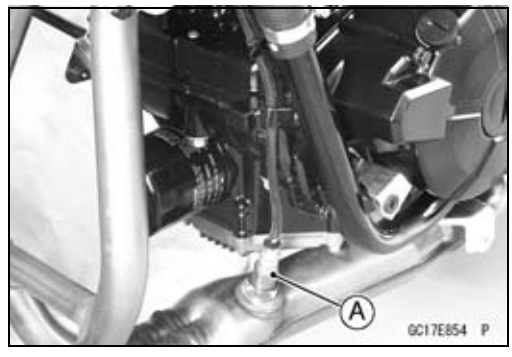
Fuel Injectors #1, #2 [A]



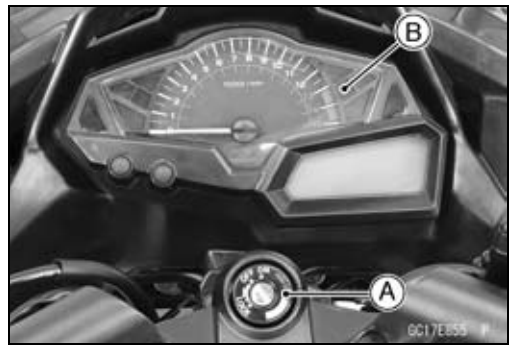
Crankshaft Sensor [A]



Oxygen Sensor (Equipped Models) [A]

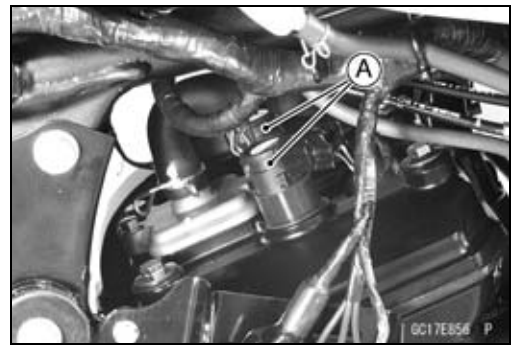


Ignition Switch [A]
Yellow Engine Warning Indicator Light (LED) [B]

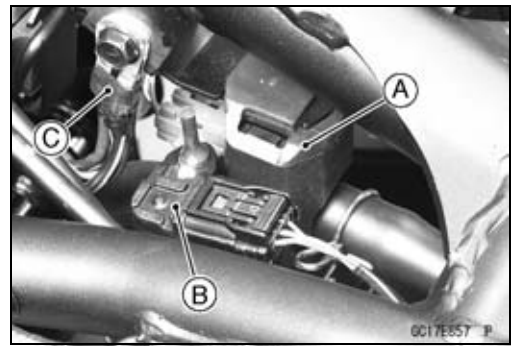


DFI Parts Location

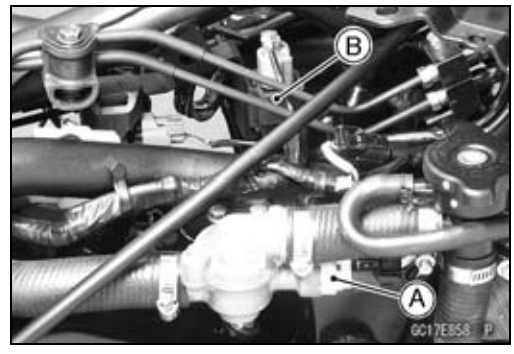
Stick Coils #1, #2 [A]



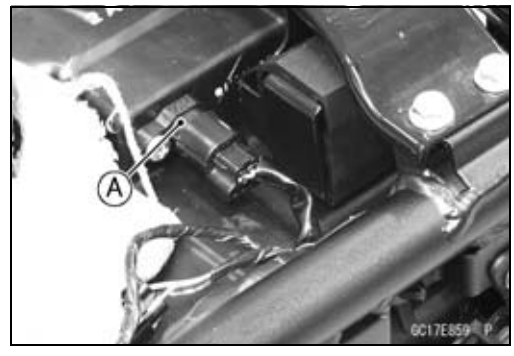
Air Switching Valve [A]
Intake Air Pressure Sensor [B]
Frame Ground [C]



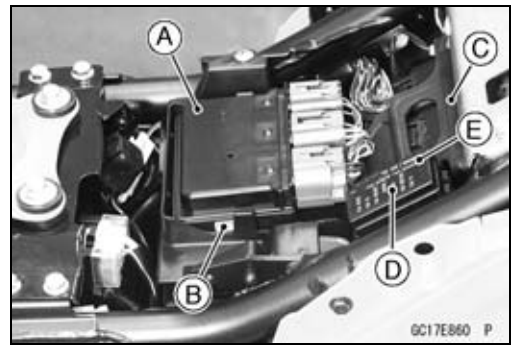
Water Temperature Sensor [A]
Vehicle-down Sensor [B]



Intake Air Temperature Sensor [A]

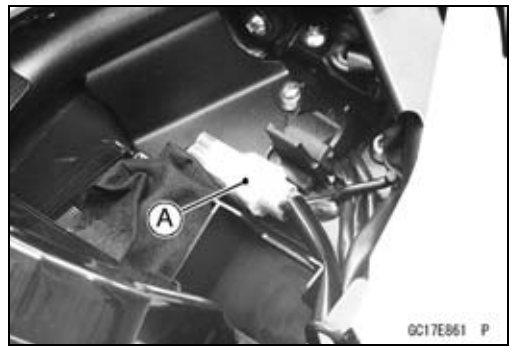


Relay Box [A]
Battery 12 V 8 Ah [B]
ECU [C]
Fuse Box 1 [D]
Fuse Box 2 [E]



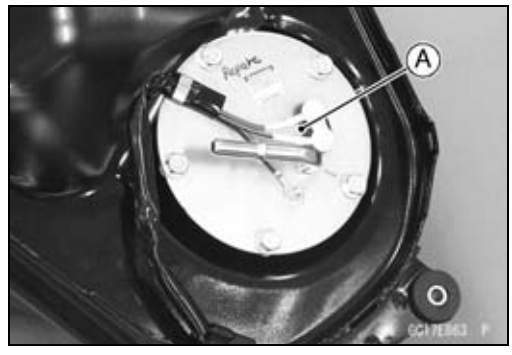
DFI Parts Location

Kawasaki Diagnostic System Connector [A]



Speed Sensor [A]

Fuel Pump [A]



Specifications

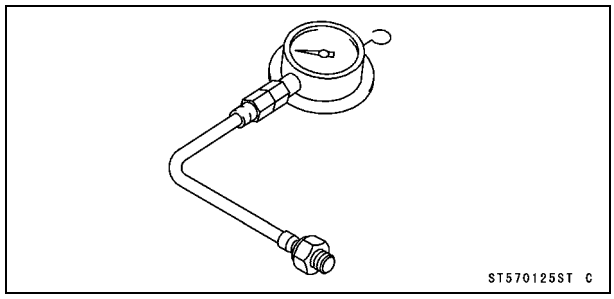
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 300 ±50 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Dual throttle valve
Bore	ϕ32 mm (1.26 in.)
Throttle Body Vacuum	24.7 ±1.33 kPa (185 ±10 mmHg) at idle speed
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)
ECU:	
Make	DENSO
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Discharge	50 mL (1.69 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	EAT-811
Nozzle Type	Fine atomizing type with 8 holes
Resistance	About 11.7 ~ 12.3 Ω at 20°C (68°F)
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.020 ~ 1.050 V at idle throttle opening DC 4.212 ~ 4.322 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Intake Air Pressure Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (see this text for details)
Intake Air Temperature Sensor:	
Output Voltage	About DC 2.25 ~ 2.50 V at intake air temperature 20°C (68°F)
Resistance	5.4 ~ 6.6 kΩ at 0°C (32°F) 0.29 ~ 0.39 kΩ at 80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 ~ 2.97 V at 20°C (68°F)
Speed Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	About DC 0.05 ~ 4 V at rear wheel turning
Vehicle-down Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	With sensor tilted 60 ~ 70° or more: DC 0.65 ~ 1.35 V With sensor arrow mark pointed up: DC 3.55 ~ 4.45 V

Specifications

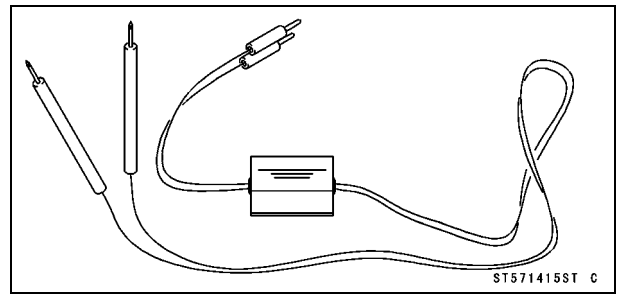
Item	Standard
Subthrottle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 0.78 ~ 0.82 V at subthrottle valve full close position
	DC 3.9 ~ 4.5 V at subthrottle valve full open position (for reference)
Resistance	4 ~ 6 kΩ
Subthrottle Valve Actuator:	
Resistance	About 5.2 ~ 7.8 Ω
Input Voltage	About DC 11.5 ~ 13.5 V
Oxygen Sensor (Equipped Models):	
Output Voltage (Rich)	DC 0.7 V or more
Output Voltage (Lean)	DC 0.2 V or less
Heater Resistance	11.7 ~ 15.5 Ω at 20°C (68°F)
Purge Valve (CAL Model):	
Resistance	30 ~ 34 Ω at 20°C (68°F)
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Air Cleaner	
Element	Polyurethane foam

Special Tools and Sealant

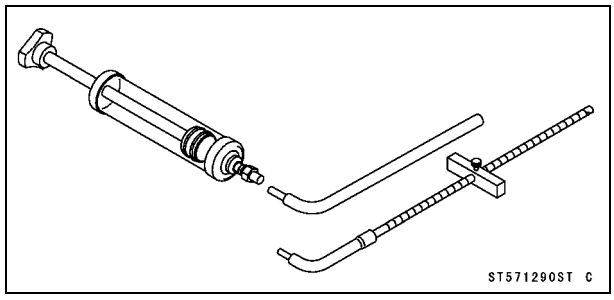
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



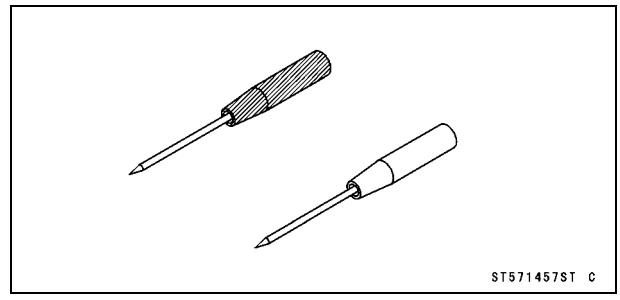
Peak Voltage Adapter:
57001-1415



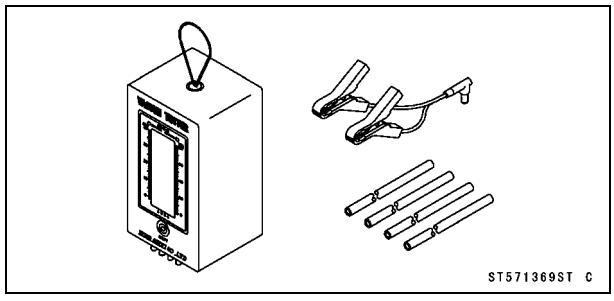
Fork Oil Level Gauge:
57001-1290



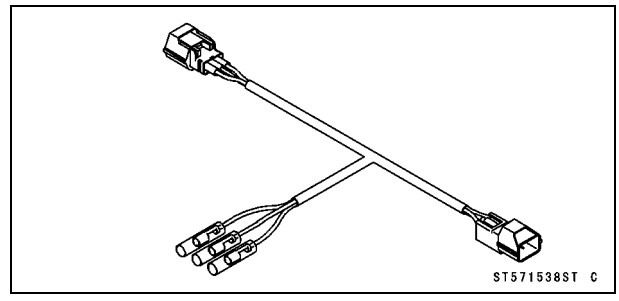
Needle Adapter Set:
57001-1457



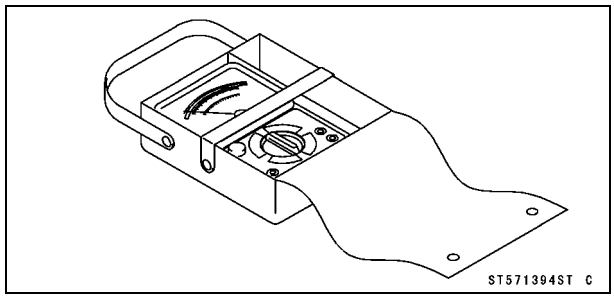
Vacuum Gauge:
57001-1369



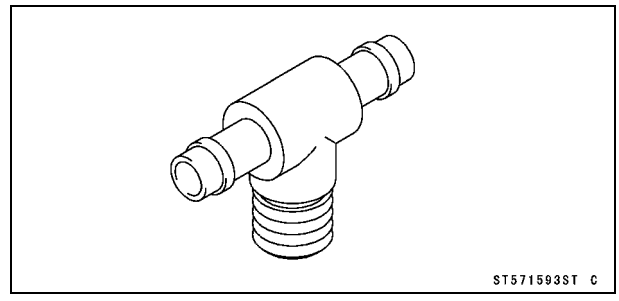
Throttle Sensor Setting Adapter:
57001-1538



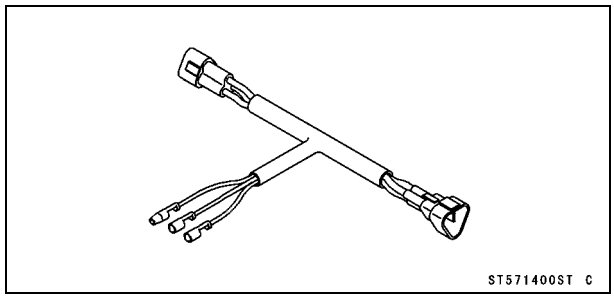
Hand Tester:
57001-1394



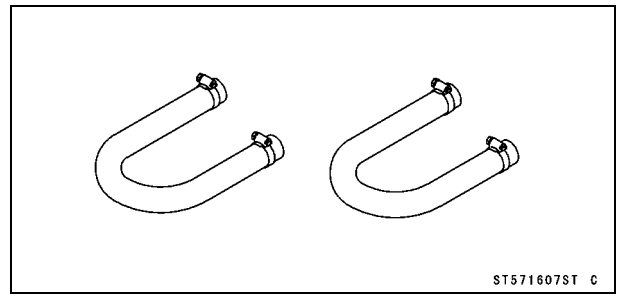
Fuel Pressure Gauge Adapter:
57001-1593



Throttle Sensor Setting Adapter #1:
57001-1400

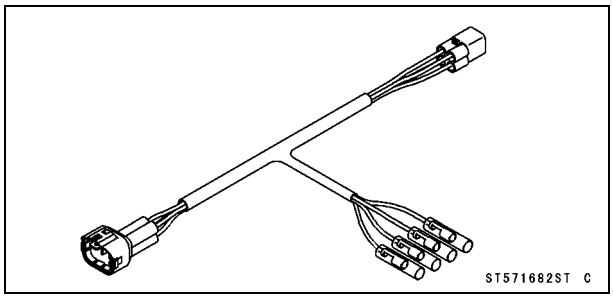


Fuel Hose:
57001-1607

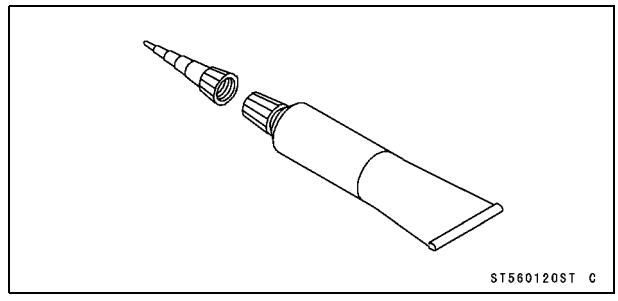


Special Tools and Sealant

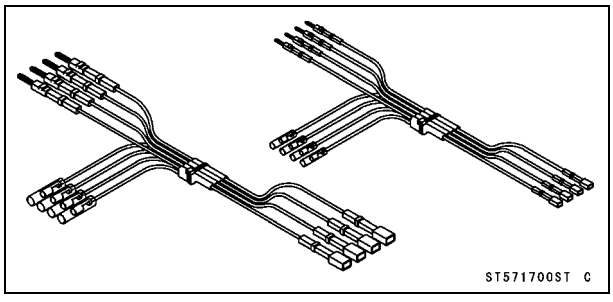
Oxygen Sensor Measuring Adapter:
57001-1682



Liquid Gasket, TB1211:
56019-120



Measuring Adapter:
57001-1700

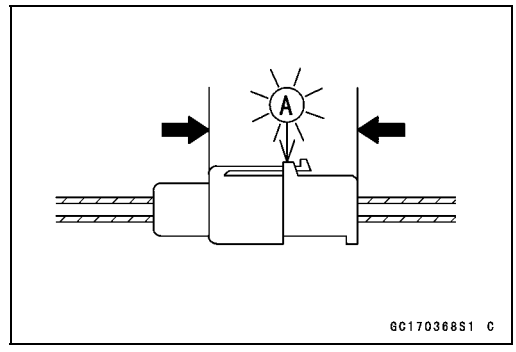


DFI Servicing Precautions

DFI Servicing Precautions

There are a number of important precautions that should be followed servicing the DFI system.

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].

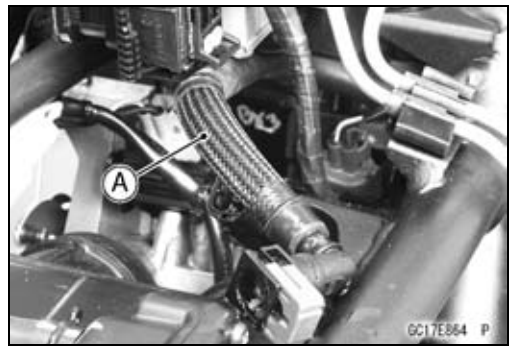


- Do not turn the ignition switch on while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads, and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the DFI system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

DFI Servicing Precautions

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak or the hose to burst. Remove the fuel tank (see Fuel Tank Removal) and check the fuel hose [A].

★Replace the fuel hose if any fraying, cracks or bulges are noticed (see Fuel Hose Replacement in the Periodic Maintenance chapter).



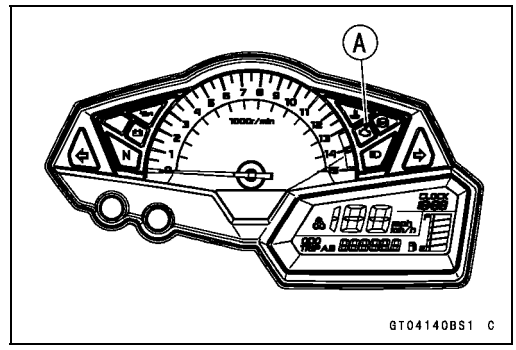
○To maintain the correct fuel/air mixture (F/A), there must be no intake air leaks in the DFI system. Be sure to install the oil filler plug [A] after filling the engine oil.

Torque - Oil Filler Plug: Hand-tighten

Troubleshooting the DFI System

Outline

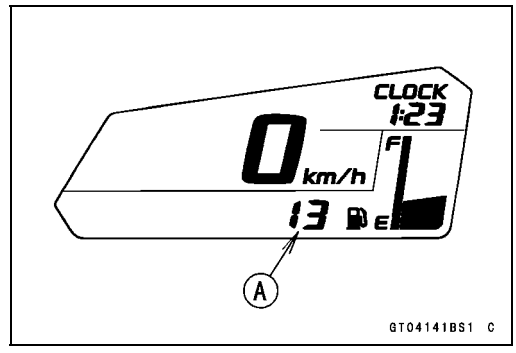
When a problem occurs with DFI system, the yellow engine warning indicator light (LED) [A] goes on or blinks to alert the rider. In addition, the condition of the problem is stored in the memory of the ECU.



With the engine stopped and turned in the self-diagnosis mode, the service code [A] is displayed on the LCD (Liquid Crystal Display) by the number of two digits.

If the problem is with the following parts, the ECU can not recognize these problem. Therefore, the yellow engine warning indicator light (LED) does not go on, and service code is not displayed.

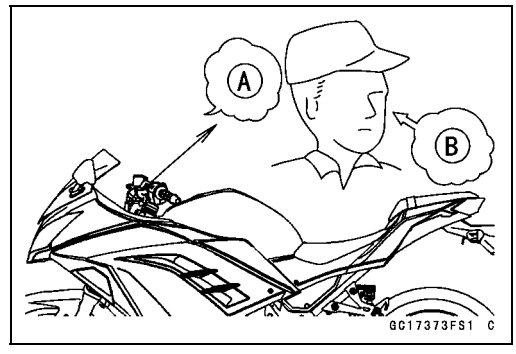
LCD for Meter Unit
Fuel Pump
Fuel Pump Relay
Fuel Injectors
Stick Coil Secondary Wiring and Ground Wiring
ECU Main Relay
ECU Power Source Wiring and Ground Wiring

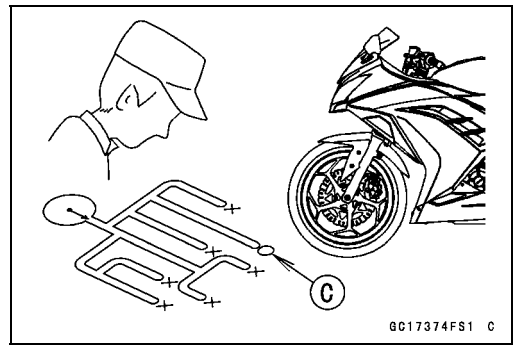


When the service code [A] is displayed, for first ask the rider about the conditions [B] of trouble, and then start to determine the cause [C] of problem.

As a pre-diagnosis inspection, check the ECU for ground and power supply, the fuel line for no fuel leaks, and for correct pressure. The pre-diagnosis items are not indicated by the yellow engine warning indicator light (LED).

Don't rely solely on the DFI self-diagnosis function, use common sense.





Troubleshooting the DFI System

Even when the DFI system is operating normally, the yellow engine warning indicator light (LED) may go on under strong electrical interference. Additional measures are not required. Turn the ignition switch off to stop the indicator light.

If the yellow engine warning indicator light (LED) of the motorcycle brought in for repair still goes on or blinks, check the service code.

When the repair has been done, the yellow engine warning indicator light (LED) goes off. But the service codes stored in memory of the ECU are not erased to preserve the problem history. The problem history can be referred using the KDS (Kawasaki Diagnostic System) when solving unstable problems.

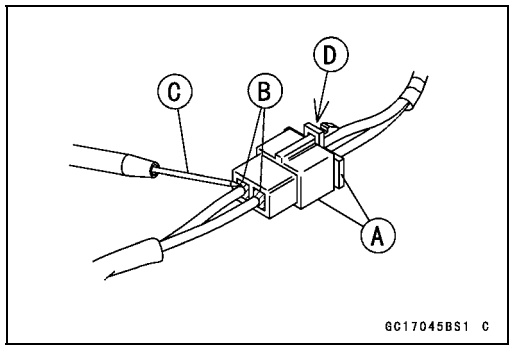
When the motorcycle is down, the vehicle-down sensor operates and the ECU shuts off the fuel pump relay, fuel injectors and ignition system. The ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. When the starter button is pushed, the yellow engine warning indicator light (LED) blinks but the service code is not displayed. To start the engine again, raise the motorcycle, turn the ignition switch off, and then on.

Much of the DFI system troubleshooting work consists of confirming continuity of the wiring. The DFI parts are assembled and adjusted with precision, and it is impossible to disassemble or repair them.

○The DFI part connectors [A] have seals [B], including the ECU.

- Join the connector and insert the needle adapters [C] inside the seals from behind the connector until the adapter reaches the terminal.

Special Tool - Needle Adapter Set: 57001-1457



NOTICE

Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

- Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of the hand tester or a digital meter.
- Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.
- Turn the ignition switch on and measure the voltage with the connector joined.

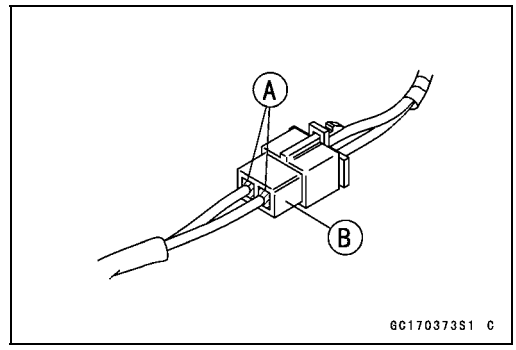
NOTICE

Incorrect, reverse connection or short circuit by needle adapters could damage the DFI or electrical system parts.

Troubleshooting the DFI System

○After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.

Sealant - Liquid Gasket, TB1211: 56019-120



- Always check battery condition before replacing the DFI parts. A fully charged battery is a must for conducting accurate tests of the DFI system.
- Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.
- Measure the coil winding resistance when the DFI part is cold (at room temperature).
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, short, etc. Deteriorated leads and bad connections can cause reappearance of problems and unstable operation of the DFI system.

★If any wiring is deteriorated, replace the wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

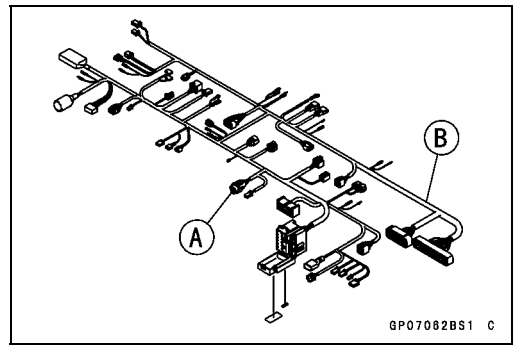
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.

- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect the hand tester between the ends of the leads.

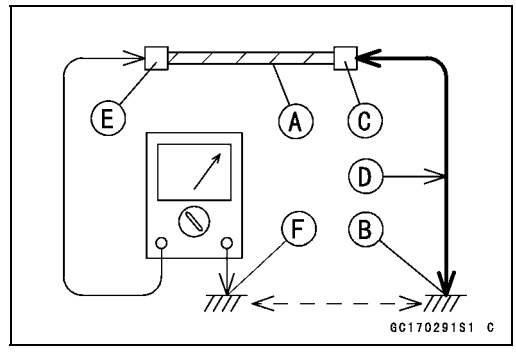
Special Tool - Hand Tester: 57001-1394



○Set the tester to the × 1 Ω range, and read the tester.

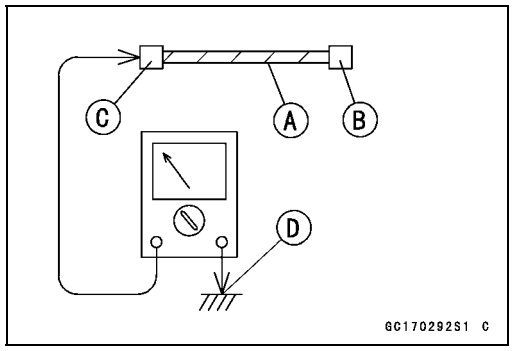
★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the main harness [B].

○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



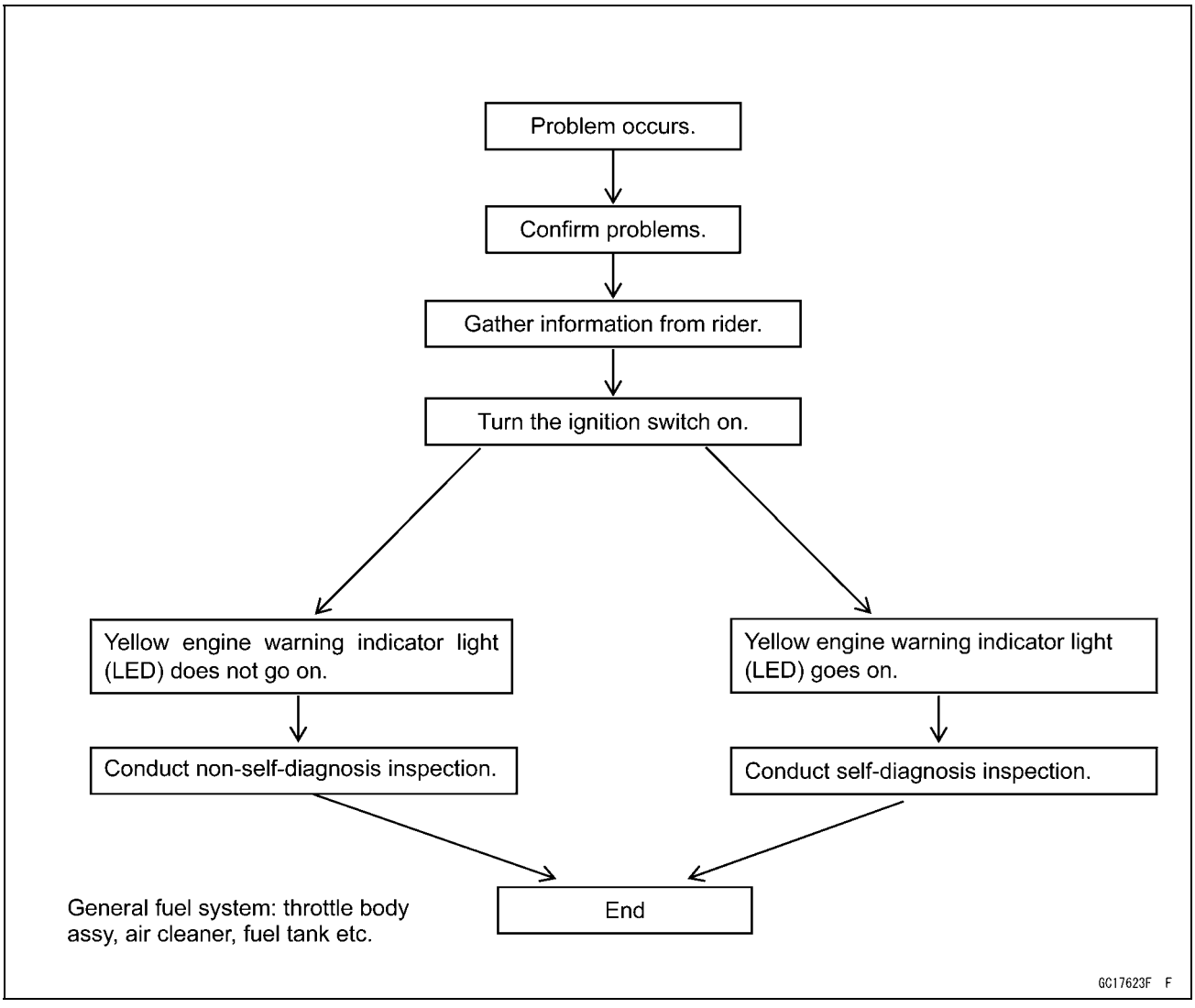
Troubleshooting the DFI System

○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



● Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.
★If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.
★If an abnormality is found, replace the affected DFI part.
★If no abnormality is found in the wiring, connectors, and DFI parts, replace the ECU.

DFI Diagnosis Flow Chart


Problem occurs.
Confirm problems.
Gather information from rider.
Turn the ignition switch on.
Yellow engine warning indicator light (LED) does not go on.
Yellow engine warning indicator light (LED) goes on.
Conduct non-self-diagnosis inspection.
Conduct self-diagnosis inspection.
End
General fuel system: throttle body assy, air cleaner, fuel tank etc.
GC17623F F

Troubleshooting the DFI System

Inquiries to Rider

○Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.

○Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.

○The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a DFI system problem, or a general engine problem.

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**
Year of initial registration:	**Model:**
Engine No.:	**Frame No.:**
Date problem occurred:	**Mileage:**
Environment when problem occurred.	
Weather	□fine, □cloudy,□rain, □snow, □always, □other:
Temperature	□hot, □warm, □cold, □very cold, □always, □other:
Problem frequency	□chronic, □often, □once
Road	□street, □highway, □mountain road (□uphill, □downhill), □bumpy, □pebble
Altitude	□normal, □high (about 1 000 m or more)
Motorcycle conditions when problem occurred.	
Yellow engine warning indicator light (LED)	□goes on immediately after turning the ignition switch on, and goes off after about 2 seconds (normal)
	□goes on immediately after turning the ignition switch on, goes off after about 2 seconds, and goes on again after about 10 seconds (ECU communication error)
	□goes on immediately after turning the ignition switch on, goes off after about 2 seconds, and goes on again (DFI problem)
	□goes on immediately after turning the ignition switch on, and stays on (DFI problem)
	□does not go on after turning the ignition switch on (light (LED), ECU or its wiring fault)
Starting difficulty	□starter motor not rotating
	□starter motor rotating but engine doesn't turn over
	□starter motor and engine don't turn over
	□no fuel flow (□no fuel in tank, □no fuel pump sound)
	□no spark
	□other
Engine stops	□right after starting
	□when opening throttle grip
	□when closing throttle grip
	□when moving off
	□when stopping the motorcycle
	□when cruising
	□other

Troubleshooting the DFI System

Poor running at low speed	☐very low idle speed, ☐very high idle speed, ☐rough idle speed
	☐battery voltage is low (charge the battery)
	☐spark plug loose (tighten it)
	☐spark plug dirty, broken, or gap maladjusted (remedy it)
	☐backfiring
	☐afterfiring
	☐hesitation when acceleration
	☐engine oil viscosity too high
	☐brake dragging
	☐engine overheating
	☐clutch slipping
	☐other
Poor running or no power at high speed	☐spark plug loose (tighten it)
	☐spark plug dirty, broken, or gap maladjusted (remedy it)
	☐spark plug incorrect (replace it)
	☐knocking (fuel poor quality or incorrect, → use unleaded gasoline)
	☐brake dragging
	☐clutch slipping
	☐engine overheating
	☐engine oil level too high
	☐engine oil viscosity too high
	☐other

DFI System Troubleshooting Guide

NOTE

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.*

○*The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.*

Engine Won't Turn Over

Symptoms or Possible Causes	Actions
Neutral, starter lockout or sidestand switch trouble	Inspect each switch (see chapter 16).
Vehicle-down sensor operated	Turn the ignition switch off (see chapter 3).
Vehicle-down sensor trouble	Inspect (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).

Poor Running at Low Speed

Symptoms or Possible Causes	Actions
Spark weak:	
Stick coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Surge:	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and replace fuel pump) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

DFI System Troubleshooting Guide

Poor Running or No Power at High Speed

Symptoms or Possible Causes	Actions
Firing incorrect:	
Stick coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel injector clogged	Inspect and repair (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often FI fuse blows.	Fuel pump bearings may wear. Replace the fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Cracked or obstructed intake air pressure sensor vacuum hose	Inspect and repair or replace (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Knocking:	
Fuel poor quality or incorrect	Fuel change (Use the gasoline recommended in the Owner's Manual).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
ECU trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Miscellaneous:	
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Speed sensor trouble	Inspect (see chapter 3).
Throttle valves will not fully open	Inspect throttle cables and lever linkage (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Engine overheating - Water temperature sensor, crankshaft sensor or speed sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17)
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
Exhaust Smokes Excessively:	
(Black smoke)	
Air cleaner element clogged	Clean element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
(Brown smoke)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).

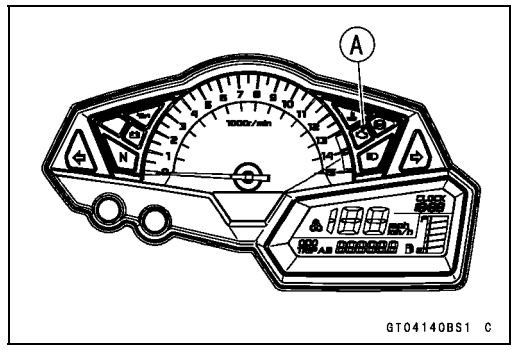
Self-Diagnosis

Self-diagnosis Outline

The self-diagnosis system has 2 modes and can be switched to another mode by operating the meter unit.

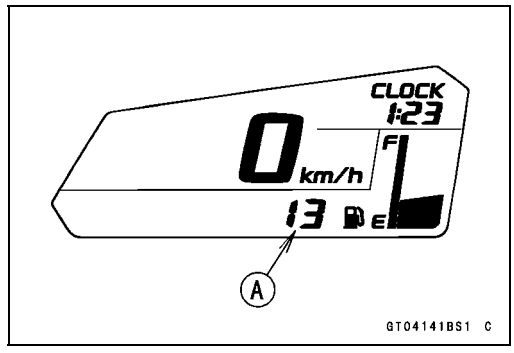
User Mode

The ECU notifies the rider of troubles in DFI system and ignition system by lighting the yellow engine warning indicator light (LED) [A] when DFI and ignition system parts are faulty, and initiates fail-safe function. In case of serious troubles ECU stops the injection and ignition operations.



Dealer Mode

The LCD (Liquid Crystal Display) displays the service code(s) [A] to show the problem(s) which the DFI system and ignition system has at the moment of diagnosis.

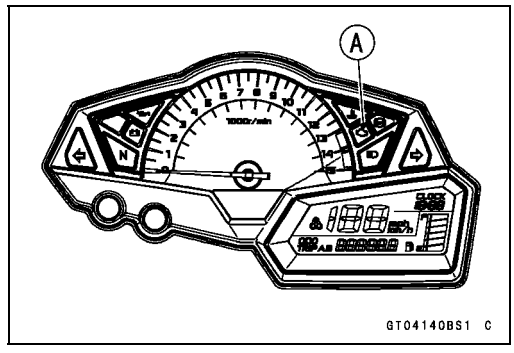


Self-diagnosis Procedures

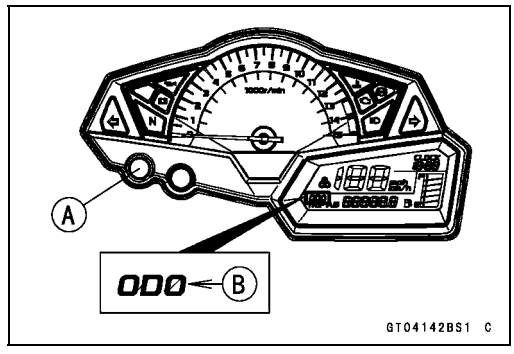
○When a problem occurs with the DFI system and ignition system, the yellow engine warning indicator light (LED) [A] goes on.

NOTE

○*Use a fully charged battery when conducting self-diagnosis. Otherwise, the light (LED) does not go on.*

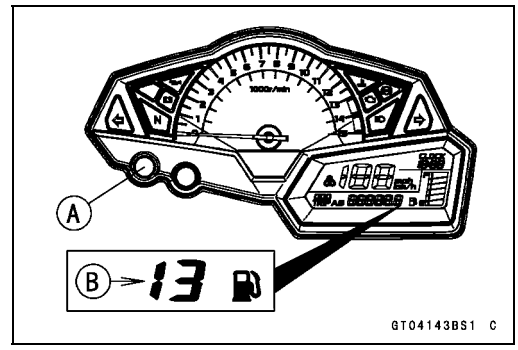


- Turn the ignition switch on.
- Press the left button [A] to select the odometer [B].



Self-Diagnosis

- Press the left button [A] for more than 2 seconds.
- The service code [B] is displayed on the LCD by the number of two digits.

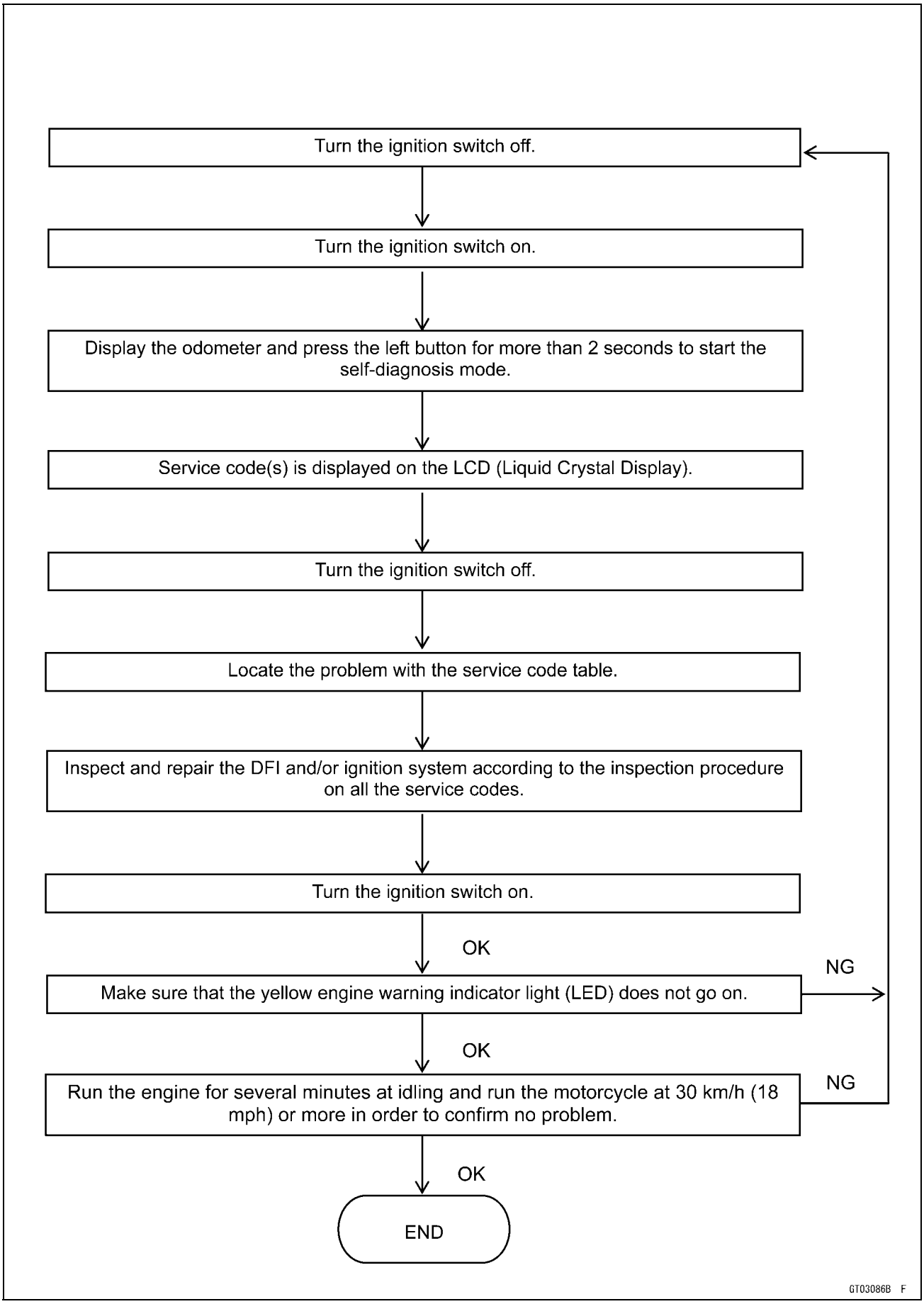


- Any of the following procedures ends self-diagnosis.

○When the service code is displayed on the LCD, press the left button for more than 2 seconds.

○Turn the ignition switch off.

Self-Diagnosis


Turn the ignition switch off.
Turn the ignition switch on.
Display the odometer and press the left button for more than 2 seconds to start the self-diagnosis mode.
Service code(s) is displayed on the LCD (Liquid Crystal Display).
Turn the ignition switch off.
Locate the problem with the service code table.
Inspect and repair the DFI and/or ignition system according to the inspection procedure on all the service codes.
Turn the ignition switch on.
OK
NG
Make sure that the yellow engine warning indicator light (LED) does not go on.
OK
NG
Run the engine for several minutes at idling and run the motorcycle at 30 km/h (18 mph) or more in order to confirm no problem.
OK
END
GTO3086B F

Self-Diagnosis

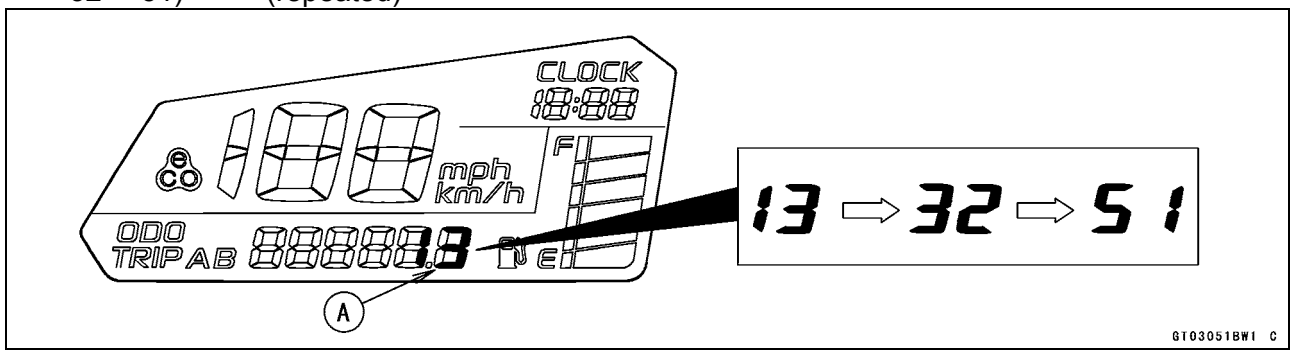
Service Code Reading

○The service code(s) [A] is displayed on the LCD by the number of two digits.

○When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.

○Then after completing all codes, the display is repeated until the ignition switch is turned off or the left button is pressed for more than 2 seconds.

○For example, if three problems occurred in the order of 51, 13, 32, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown below. (13 → 32 → 51)→(13 → 32→ 51) →· · ·(repeated)



○If there is no problem or when the repair has been done, the yellow engine warning indicator light (LED) goes off and service code is not displayed.

Service Code Erasing

○When repair has been done, the yellow engine warning indicator light (LED) goes off and service code is not displayed.

★The service codes stored in memory of the ECU can be erased using Kawasaki Diagnostic System (KDS Ver.3).

Self-Diagnosis

Service Code Table

Service Code	Problems
11	Main throttle sensor malfunction, wiring open or short
12	Intake air pressure sensor malfunction, wiring open or short
13	Intake air temperature sensor malfunction, wiring open or short
14	Water temperature sensor malfunction, wiring open or short
21	Crankshaft sensor malfunction, wiring open or short
24	Speed sensor malfunction, wiring open or short
31	Vehicle-down sensor malfunction, wiring open or short
32	Subthrottle sensor malfunction, wiring open or short
33	Oxygen sensor inactivation, wiring open or short (equipped models)
51	Stick coil #1 malfunction, wiring open or short
52	Stick coil #2 malfunction, wiring open or short
56	Radiator fan relay malfunction, wiring open or short
62	Subthrottle valve actuator malfunction, wiring open or short
64	Air switching valve malfunction, wiring open or short
67	Oxygen sensor heater malfunction, wiring open or short (equipped models)
94	Oxygen sensor malfunction, wiring open or short (equipped models)
3A	Purge valve malfunction, wiring open or short (CAL model)

Notes:

- The ECU may be involved in these problems. If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- When no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.

Self-Diagnosis

Backups

○The ECU takes the following measures to prevent engine damage when the DFI or the ignition system parts have troubles.

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
11	Main Throttle Sensor	Main Throttle Sensor Output Voltage 0.2 ~ 4.8 V	If the main throttle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the D-J method (1). Also, the main throttle sensor system and intake air pressure fails, the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the α-N method (2).
12	Intake Air Pressure Sensor	Intake Air Pressure (absolute) Pv = 150 ~ 800 mmHg	If the intake air pressure sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets the DFI in the α-N method.
13	Intake Air Temperature Sensor	Intake Air Temperature Ta = –30°C ~ +120°C	If the intake air temperature sensor fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 40°C.
14	Water Temperature Sensor	Water Temperature Tw = –30°C ~ +120°C	If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C.
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals to the ECU at the one cranking.	If the crankshaft sensor generates other than 22 signals, the engine stops by itself.
24	Speed Sensor	Speed sensor must send 4 signals to the ECU at the one rotation of the engine sprocket. The gear position is decided by the signal of the speed sensor.	If the speed sensor system fails (no signal, wiring short or open), the speedometer shows 0, and the ECU sets the top (6) gear position.
31	Vehicle-down Sensor	Output Voltage (signal) Vd = 0.65 ~ 4.45 V	If the vehicle-down sensor system has failures (the output voltage Vd is more than usable range, wiring open), the ECU shuts off the fuel pump, the fuel injectors and the ignition system.
32	Subthrottle Sensor	Output Voltage 0.15 ~ 4.85 V	If the subthrottle sensor system fails (the signal is out of the usable range, wiring short or open), the ECU drive the subthrottle valve to the full closed position, and it stops the current to the actuator.
33	Oxygen Sensor (Equipped Models)	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated, the ECU stops oxygen sensor feedback mode.

Self-Diagnosis

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
51	Stick Coil #1*	The ECU must send signals continuously to the stick coil primary winding.	If the stick coil #1 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #1 to stop fuel to the cylinder #1, though the engine keeps running.
52	Stick Coil #2*	The ECU must send signals continuously to the stick coil primary winding.	If the stick coil #2 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #2 to stop fuel to the cylinder #2, though the engine keeps running.
56	Radiator Fan Relay	When the relay OFF condition, the fan relay is open.	–
62	Subthrottle Valve Actuator	The actuator operates open and close of the subthrottle valve by the pulse signal from the ECU.	If the subthrottle valve actuator fails (the signal is out of the usable range, wiring short or open), the ECU stops the current to the actuator.
64	Air Switching Valve	The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–
67	Oxygen Sensor (Equipped Models)	The oxygen sensor heater raise temperature of the sensor for its earlier activation. 12 V-6.6 W, 0.55 A	If the oxygen sensor heater fails (wiring short or open), the ECU stops the current to the heater.
94	Oxygen Sensor (Equipped Models)	The oxygen sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor output voltage is incorrect, the ECU stops oxygen sensor feed back mode.
3A	Purge Valve (CAL Model)	The purge valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–

Note:

(1): D-J Method: When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (intake air pressure sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J method (low-speed mode).

(2): α-N Method: As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α-N method (high-speed mode).

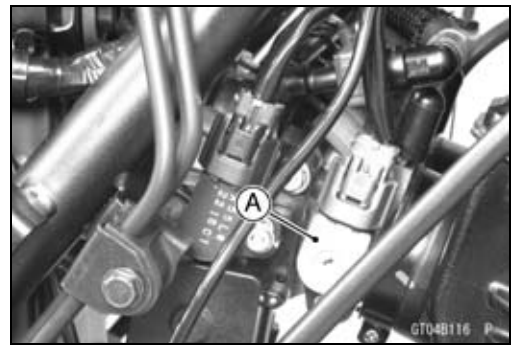
(*): This depends on the number of stopped cylinders.

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Removal/Adjustment

NOTICE

Do not remove or adjust the main throttle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy especially on a hard surface. Such a shock to the main throttle sensor can damage it.



Main Throttle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the main throttle sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

- Connect a digital meter to the harness adapter leads.

Main Throttle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → BK (sensor G) lead
Digital Meter (–) → W (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Input Voltage
Standard: DC 4.75 ~ 5.25 V

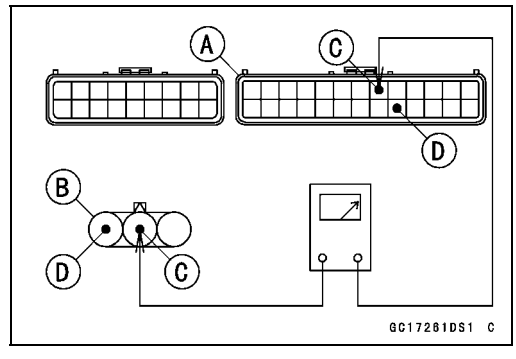
- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Main Throttle Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
G lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Output Voltage Inspection

- Measure the output voltage at the main throttle sensor in the same way as input voltage inspection.

○Disconnect the main throttle sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Main Throttle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor Y/W) lead
Digital Meter (–) → W (sensor BR/BK) lead

- Start the engine and warm it up thoroughly.
- Check idle speed to ensure the throttle opening is correct.

Idle Speed
Standard: 1 300 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it (see Idle Speed Adjustment in the Periodic Maintenance chapter).

- Turn the ignition switch off.
- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Output Voltage
Standard: DC 1.020 ~ 1.050 V at idle throttle opening
DC 4.212 ~ 4.322 V at full throttle opening (for reference)

NOTE

○*Open the throttle, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
1.020 × 4.75 ÷ 5.00 = 0.969 V
1.050 × 4.75 ÷ 5.00 = 0.998 V
Thus, the valid range is 0.969 ~ 0.998 V

- Turn the ignition switch off.

★If the reading is out of the standard, check the main throttle sensor resistance (see Main Throttle Sensor Resistance Inspection).

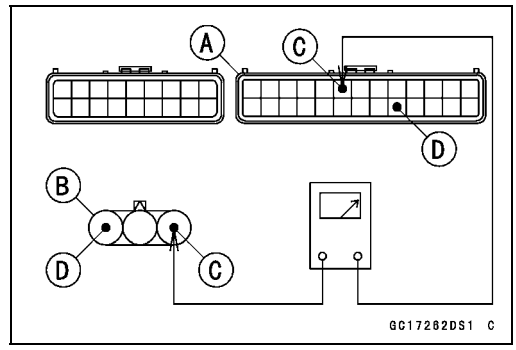
Main Throttle Sensor (Service Code 11)

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
Y/W lead (ECU terminal 6) [C]
BR/BK lead (ECU terminal 22) [D]

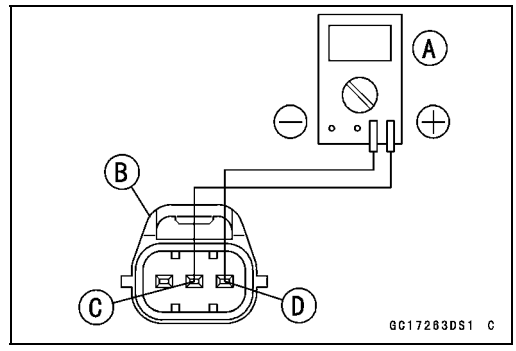


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Main Throttle Sensor Resistance Inspection

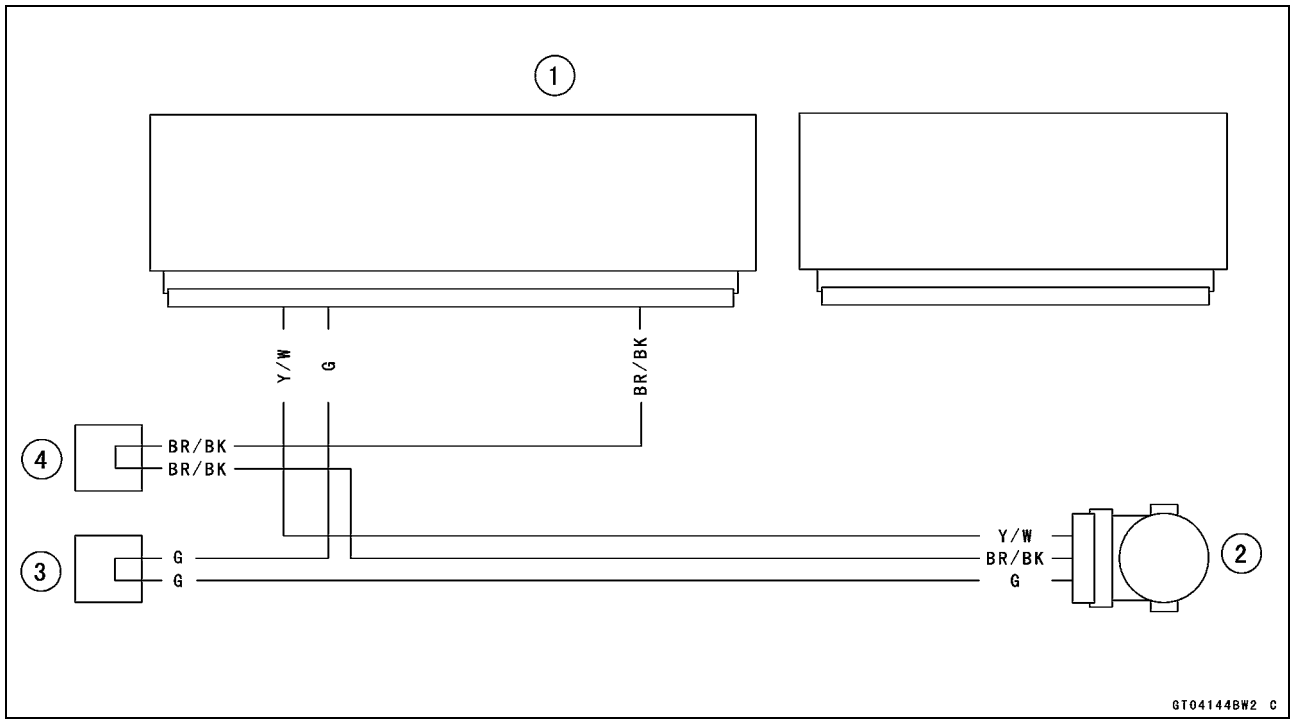
- Turn the ignition switch off.
- Disconnect the main throttle sensor connector.
- Connect a digital meter [A] to the main throttle sensor connector [B].
- Measure the main throttle sensor resistance.

Main Throttle Sensor Resistance
Connections: G lead [C] ←→ BR/BK lead [D]
Standard: 4 ~ 6 kΩ



★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).
★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Main Throttle Sensor Circuit



1. ECU
2. Main Throttle Sensor
3. Water-proof Joint 4
4. Water-proof Joint 3

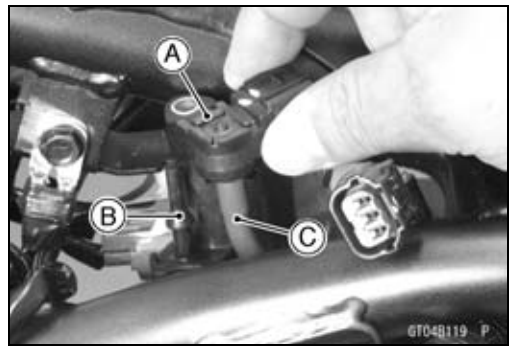
Intake Air Pressure Sensor (Service Code 12)

Intake Air Pressure Sensor Removal

NOTICE

Never drop the intake air pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air pressure sensor connector [A].



- Remove the intake air pressure sensor [A] from the rubber damper [B] of the air switching valve and disconnect the vacuum hose [C].

Intake Air Pressure Sensor Installation

- Installation is the reverse of removal.

Intake Air Pressure Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter to the harness adapter leads.

Intake Air Pressure Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → G (sensor G) lead
Digital Meter (–) → G/W (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor Output Voltage Inspection).

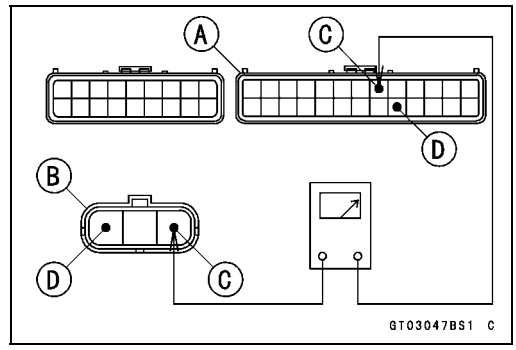
Intake Air Pressure Sensor (Service Code 12)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor Connector [B]
G lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Intake Air Pressure Sensor Output Voltage Inspection

● Measure the output voltage at the intake air pressure sensor in the same way as input voltage inspection.
○Disconnect the intake air pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Measuring Adapter: 57001-1700

Intake Air Pressure Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → BK (sensor Y/BL) lead
Digital Meter (–) → G/W (sensor BR/BK) lead

● Measure the output voltage with the engine stopped and with the connector joined.
● Turn the ignition switch on.

Output Voltage
Usable Range: **DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)**

NOTE

○*The output voltage changes according to local atmospheric pressure.*

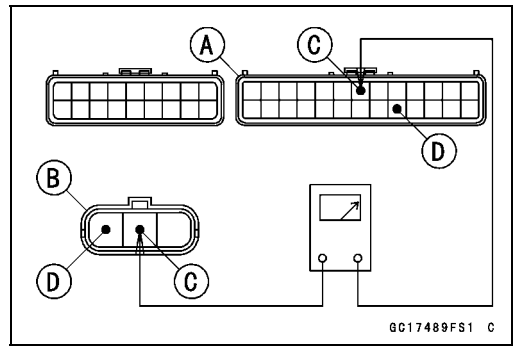
● Turn the ignition switch off.
★If the reading is out of the usable range, replace the sensor.

★If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connector.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor Connector [B]
Y/BL lead (ECU terminal 7) [C]
BR/BK lead (ECU terminal 22) [D]



Intake Air Pressure Sensor (Service Code 12)

★If the wiring is good, check the sensor for various vacuum.
- Remove the intake air pressure sensor [A] and disconnect the vacuum hose from the sensor.
- Connect an auxiliary hose [B] to the intake air pressure sensor.
- Temporarily install the intake air pressure sensor.

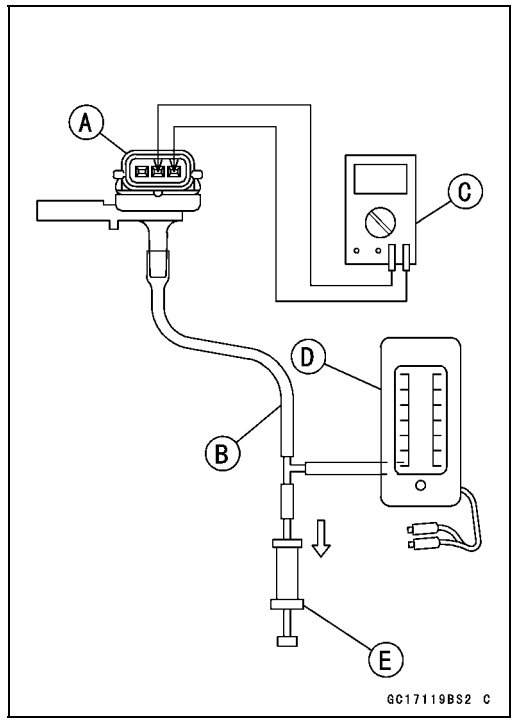
○Connect a digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the harness adapter to the intake air pressure sensor.

Special Tools - Fork Oil Level Gauge: 57001-1290
Vacuum Gauge: 57001-1369
Measuring Adapter: 57001-1700

Intake Air Pressure Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → BK (sensor Y/BL) lead

Digital Meter (–) → G/W (sensor BR/BK) lead



○Turn the ignition switch on.
○Measure the intake air pressure sensor output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.
○Check the intake air pressure sensor output voltage, using the following formula and chart.

Suppose:
Pg: Vacuum Pressure (Gauge) to Sensor
Pl: Local Atmospheric Pressure (Absolute) measured by a barometer
Pv: Vacuum Pressure (Absolute) to Sensor
Vv: Sensor Output Voltage (V)

then
Pv = Pl – Pg

For example, suppose the following data is obtained:
Pg = 8 cmHg (Vacuum Gauge Reading)
Pl = 70 cmHg (Varometer Reading)
Vv = 3.2 V (Digital Meter Reading)

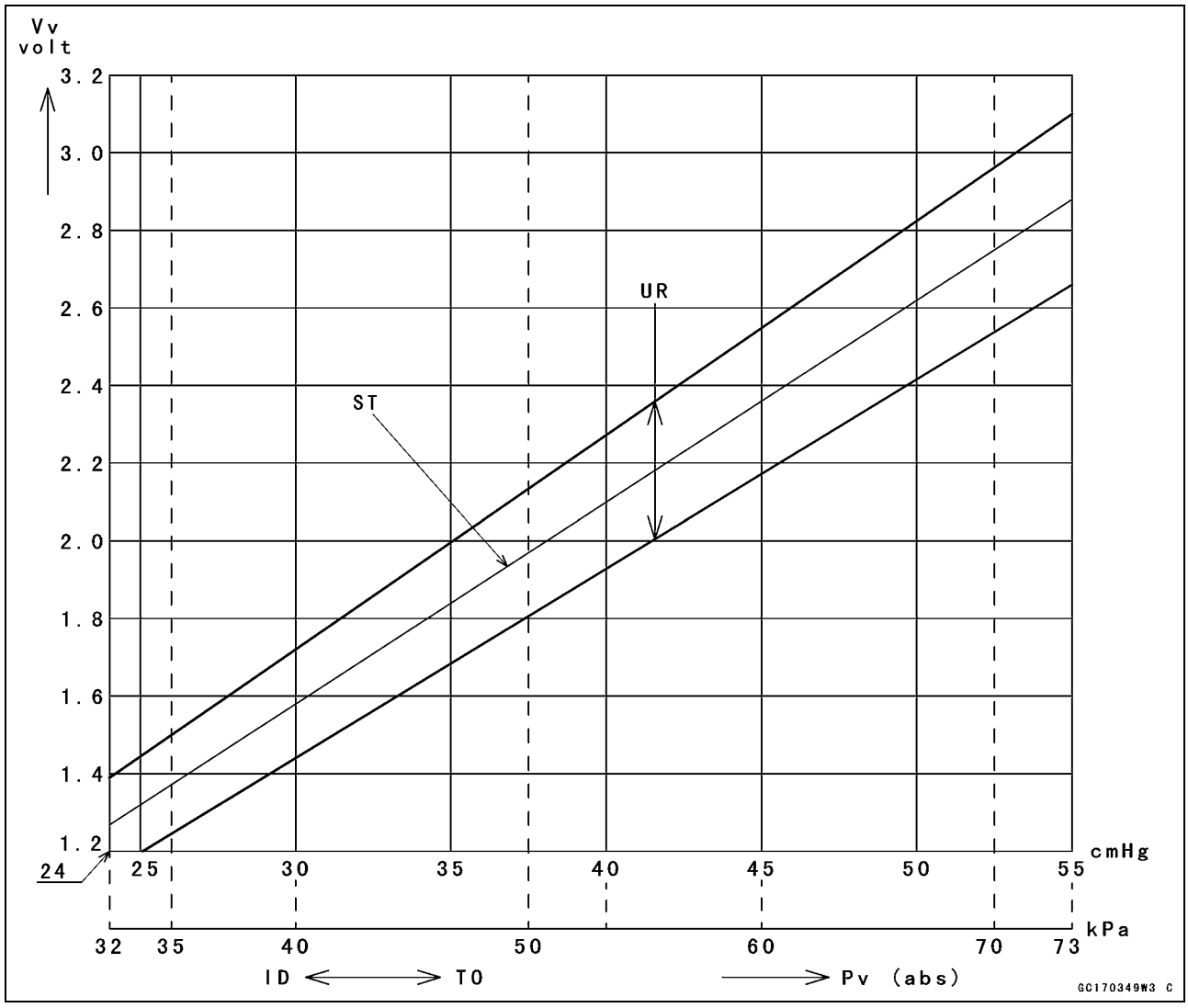
then
Pv = 70 – 8 = 62 cmHg (Absolute)

Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.
Usable range = 3.04 ~ 3.49 V

Plot Vv (3.2 V) on the vertical line. → Point [3].
Results: In the chart, Vv is within the usable range and the sensor is normal.

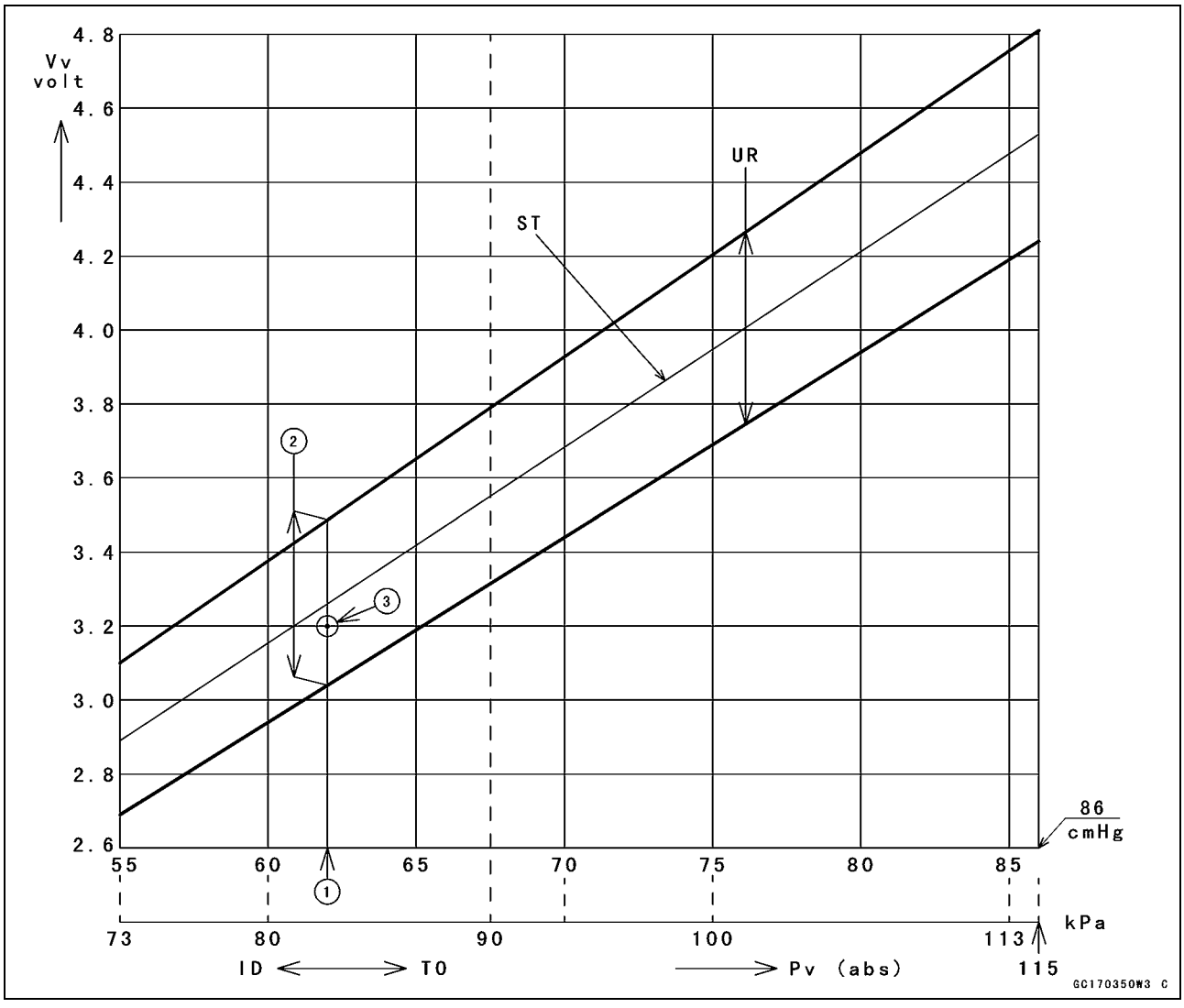
Intake Air Pressure Sensor (Service Code 12)

Pv = 24 ~ 55 cmHg



Intake Air Pressure Sensor (Service Code 12)

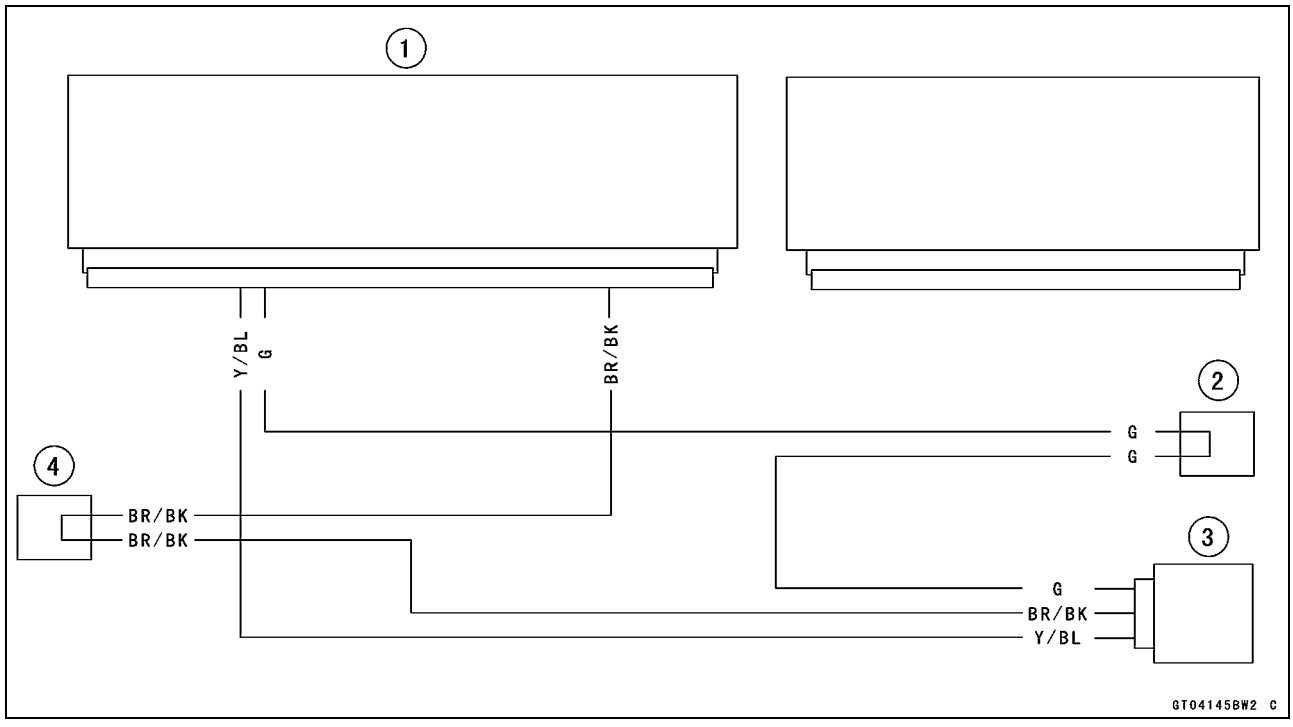
Pv = 55 ~ 86 cmHg



ID: Idling
Ps: Standard Atmospheric Pressure (Absolute)
Pv: Throttle Vacuum Pressure (Absolute)
ST: Standard of Sensor Output Voltage (V)
TO: Throttle Full Open
UR: Usable Range of Sensor Output Voltage (V)
Vv: Intake Air Pressure Sensor Output Voltage (V) (Digital Meter Reading)

Intake Air Pressure Sensor (Service Code 12)

Intake Air Pressure Sensor Circuit



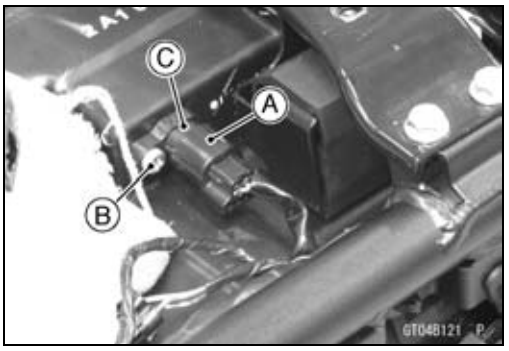
1. ECU
2. Water-proof Joint 4
3. Intake Air Pressure Sensor
4. Water-proof Joint 3

Intake Air Temperature Sensor (Service Code 13)

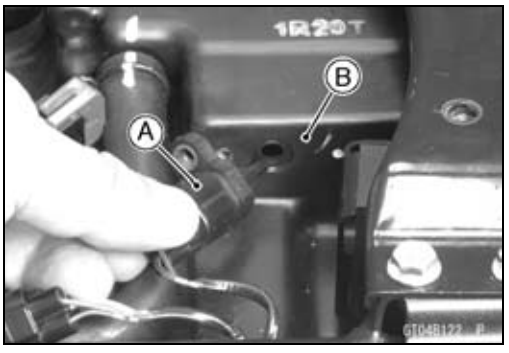
Intake Air Temperature Sensor Removal/Installation

NOTICE

Never drop the intake air temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.



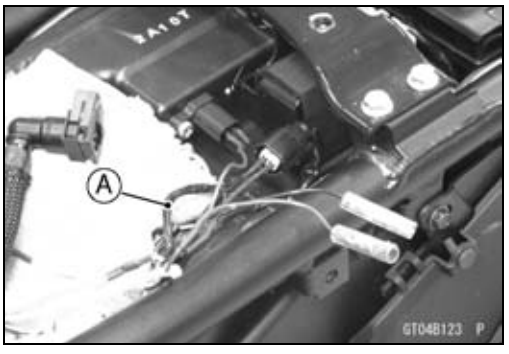
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air temperature sensor connector [A].
- Remove the intake air temperature sensor screw [B] and pull out the intake air temperature sensor [C].



- Put the intake air temperature sensor [A] into the air cleaner housing [B].
- Tighten:

Torque - Intake Air Temperature Sensor Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Intake Air Temperature Sensor Output Voltage Inspection



NOTE

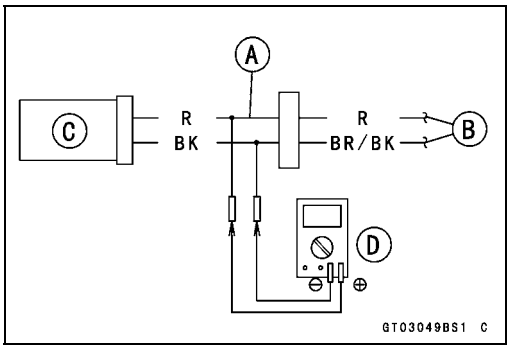
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air temperature sensor connector and connect the harness adapter [A] between these connectors as shown.

  Main Harness [B]

  Intake Air Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect a digital meter [D] to the harness adapter leads.

Intake Air Temperature Sensor Output Voltage
Connections to Adapter:

Digital Meter (+) → R (sensor R) lead

Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the output voltage with the engine stopped and the connector joined.
- Turn the ignition switch on.

Output Voltage
Standard: About DC 2.25 ~ 2.50 V at intake air temperature 20°C (68°F)

NOTE

○*The output voltage changes according to the intake air temperature.*

Intake Air Temperature Sensor (Service Code 13)

● Turn the ignition switch off.

★If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

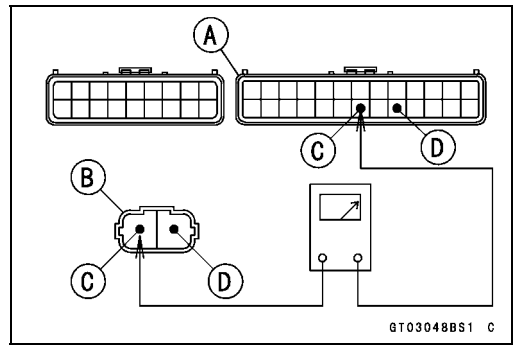
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Temperature Sensor Connector [B]
R lead (ECU terminal 20) [C]
BR/BK lead (ECU terminal 22) [D]



★If the wiring is good, check the intake air temperature sensor resistance (see Intake Air Temperature Sensor Resistance Inspection).

Intake Air Temperature Sensor Resistance Inspection

● Remove the intake air temperature sensor (see Intake Air Temperature Sensor Removal/Installation).

● Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion is submerged.

● Suspend a thermometer [B] with the heat-sensitive portion [C] located in almost the same depth with the sensor.

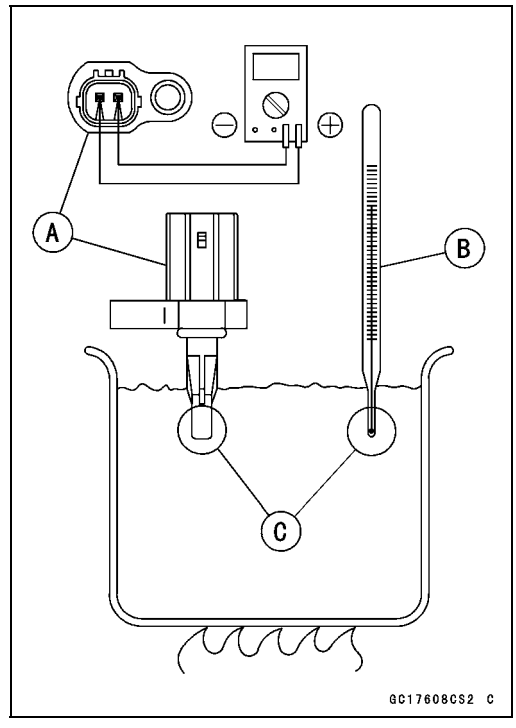
NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

● Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.

● Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

Intake Air Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ at 0°C (32°F)
0.29 ~ 0.39 kΩ at 80°C (176°F)

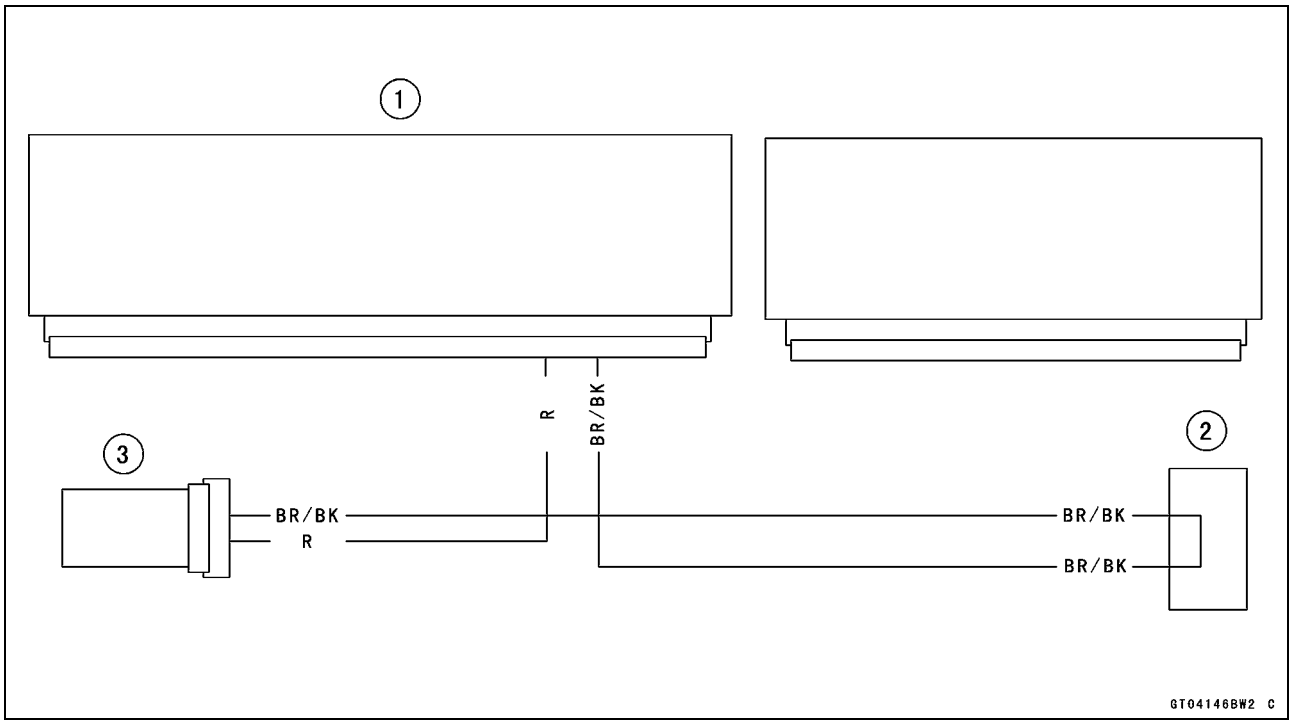


★If the reading is out of the standard, replace the sensor.

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Circuit



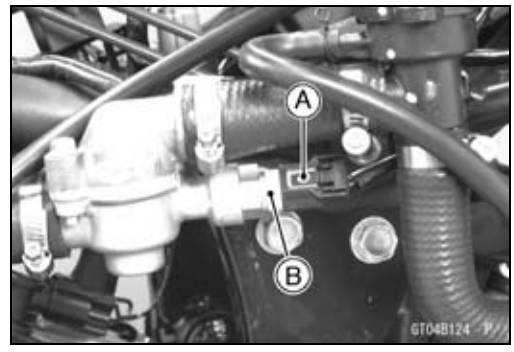
1. ECU
2. Water-proof Joint 3
3. Intake Air Temperature Sensor

Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Removal/Installation

NOTICE

Never drop the water temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.

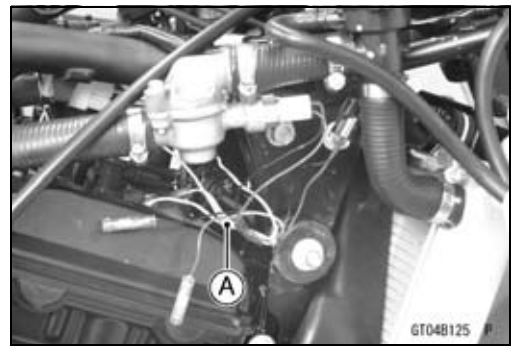


- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the connector [A].
- Remove the water temperature sensor [B].
- Replace the gasket with a new one, and tighten the water temperature sensor.

Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)

- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

Water Temperature Sensor Output Voltage Inspection

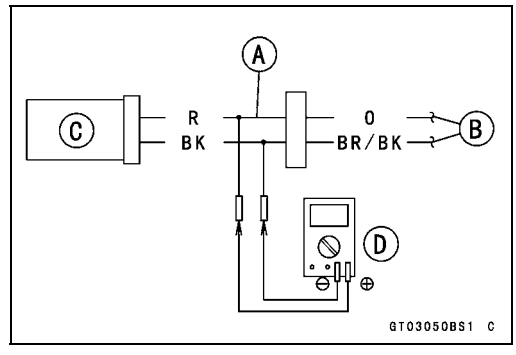


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect the water temperature sensor connector and connect the harness adapter [A] between these connectors as shown.
  Main Harness [B]
  Water Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect a digital meter [D] to the harness adapter leads.

Water Temperature Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor O) lead
Digital Meter (–) → BK (sensor BR/BK) lead

- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Output Voltage
Standard: About DC 2.80 ~ 2.97 V at 20°C (68°F)

NOTE

○*The output voltage changes according to the coolant temperature in the engine.*

- Turn the ignition switch off.

★If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

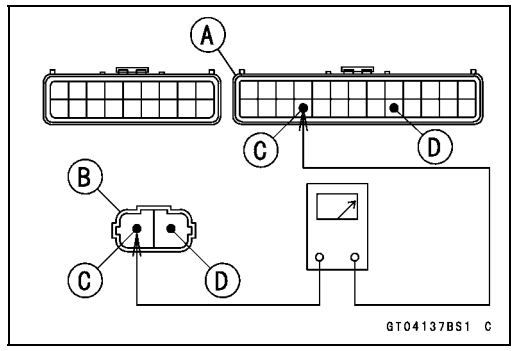
Water Temperature Sensor (Service Code 14)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Water Temperature Sensor Connector [B]
O lead (ECU terminal 17) [C]
BR/BK lead (ECU terminal 22) [D]



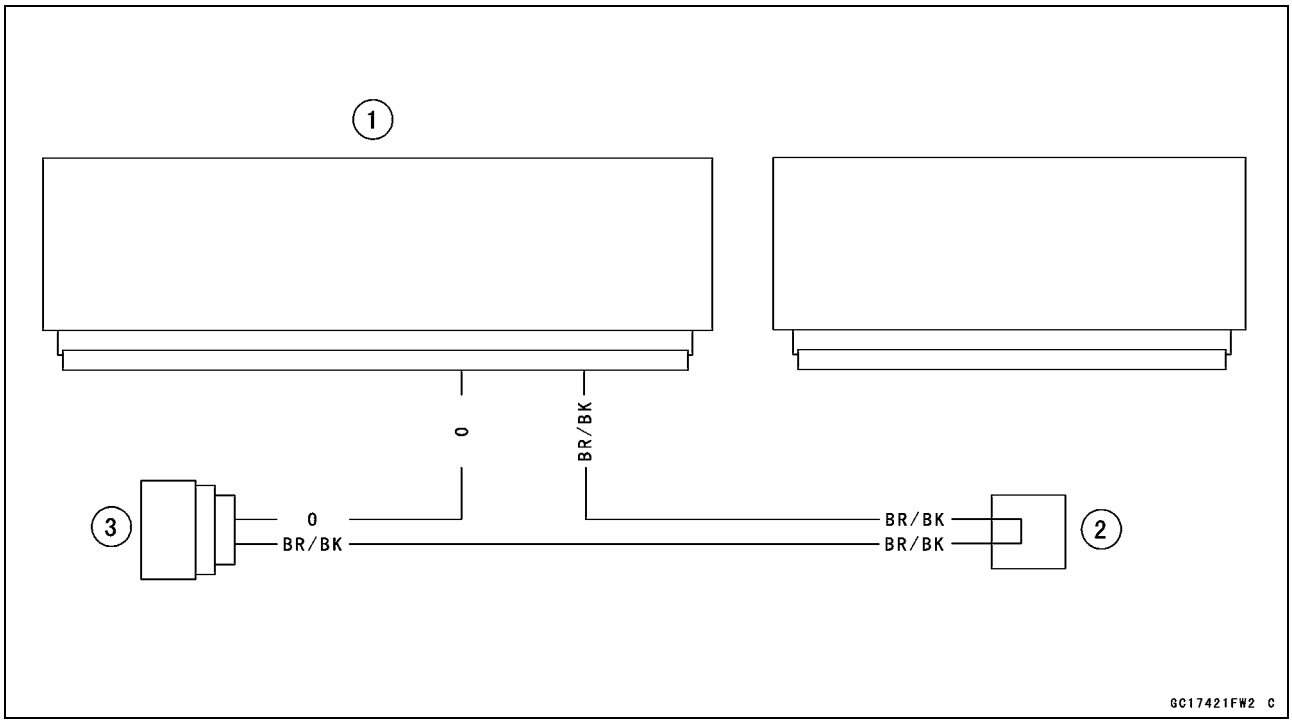
★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

Water Temperature Sensor Resistance Inspection

● Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Water Temperature Sensor Circuit



1. ECU
2. Water-proof Joint 3
3. Water Temperature Sensor

Crankshaft Sensor (Service Code 21)

The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.

Crankshaft Sensor Removal/Installation

● Refer to the Crankshaft Sensor Removal/Installation in the Electrical System chapter.

Crankshaft Sensor Resistance Inspection

● Refer to the Crankshaft Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, check the peak voltage (see Crankshaft Sensor Peak Voltage Inspection).

Crankshaft Sensor Peak Voltage Inspection

● Refer to the Crankshaft Sensor Peak Voltage Inspection in the Electrical System chapter.

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

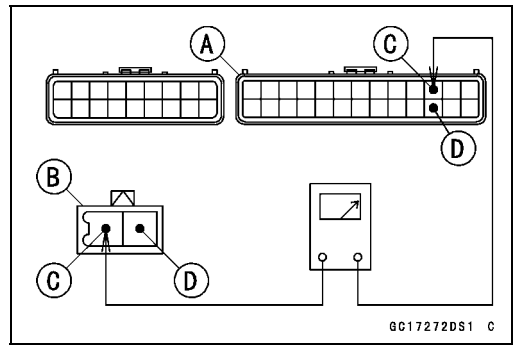
Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

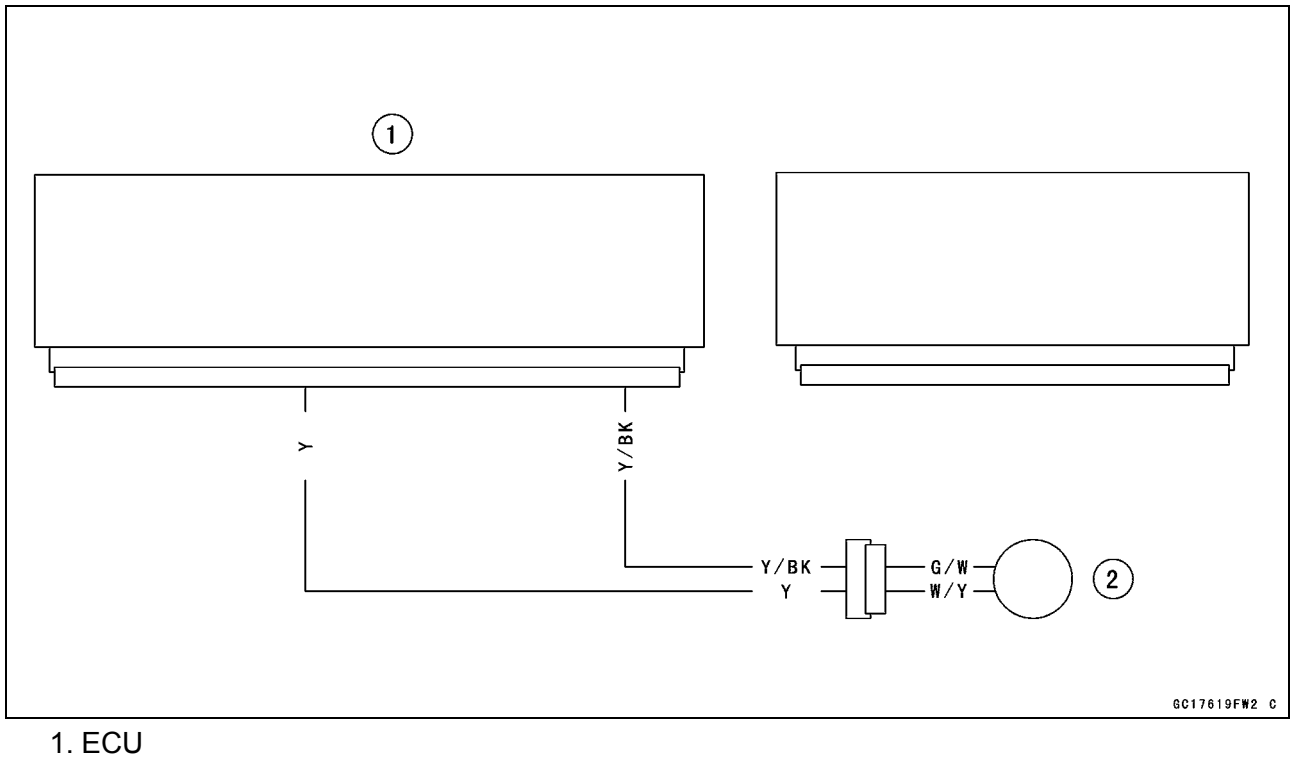
Wiring Continuity Inspection
ECU Connector [A] ←→
Crankshaft Sensor Connector [B]
Y lead (ECU terminal 11) [C]
Y/BK lead (ECU terminal 24) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



Crankshaft Sensor Circuit



1. ECU
2. Crankshaft Sensor

Speed Sensor (Service Code 24)

Speed Sensor Removal/Installation

● Refer to the Speed Sensor Removal/Installation in the Electrical System chapter.

Speed Sensor Inspection

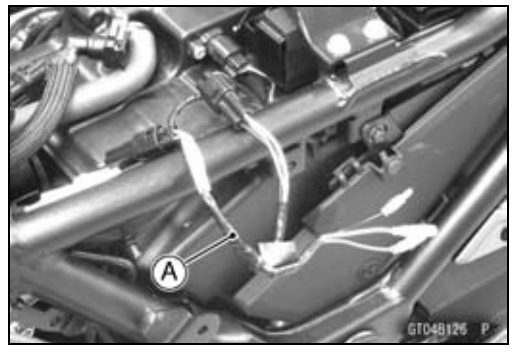
● Refer to the Speed Sensor Inspection in the Electrical System chapter.

Speed Sensor Input Voltage Inspection

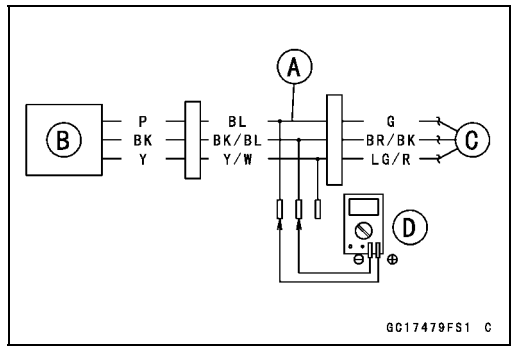
NOTE

○*Be sure the battery is fully charged.*

● Turn the ignition switch off.
● Remove the fuel tank (see Fuel Tank Removal).
● Disconnect the speed sensor connector and connect the harness adapter [A] between speed sensor [B] and main harness [C] connectors.
● Connect a digital meter [D] to the harness adapter leads.



Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400



Speed Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → BL (sensor P) lead
Digital Meter (–) → BK/BL (sensor BK) lead

● Measure the input voltage with the engine stopped and with the connector joined.
● Turn the ignition switch on.

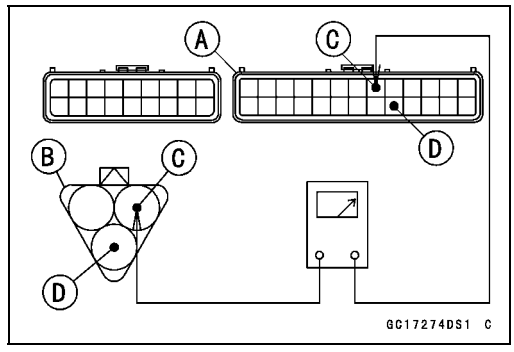
Input Voltage
Standard: DC 4.75 ~ 5.25 V

● Turn the ignition switch off.
★If the reading is within the standard, check the output voltage (see Speed Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

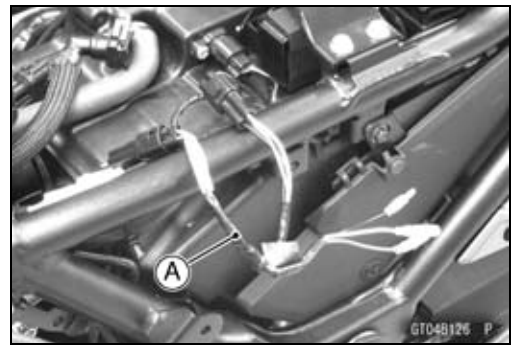


Wiring Continuity Inspection
ECU Connector [A] ←→
Speed Sensor Connector [B]
G lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Speed Sensor (Service Code 24)

Speed Sensor Output Voltage Inspection

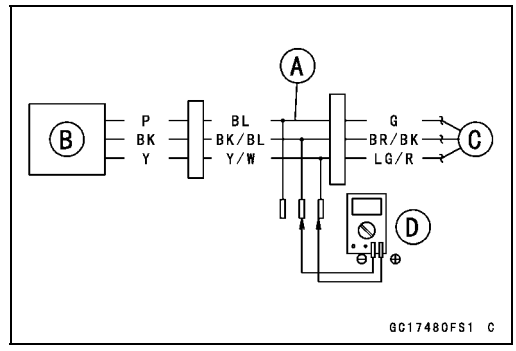


- Raise the rear wheel off the ground with the stand.
- Measure the output voltage at the speed sensor in the same way as input voltage inspection.

○Disconnect the speed sensor connector and connect the harness adapter [A] between speed sensor [B] and main harness [C] connectors.

- Connect a digital meter [D] to the harness adapter leads.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400



Speed Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → Y/W (sensor Y) lead
Digital Meter (–) → BK/BL (sensor BK) lead

- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

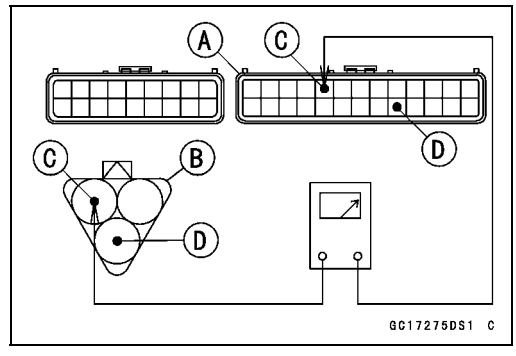
Output Voltage
Standard: About DC 0.05 ~ 4 V at rear wheel turning

NOTE

○*Rotate the rear wheel by hand, confirm the output voltage will be raise or lower.*

- Turn the ignition switch off.

★If the reading is out of the standard, replace the sensor.



★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

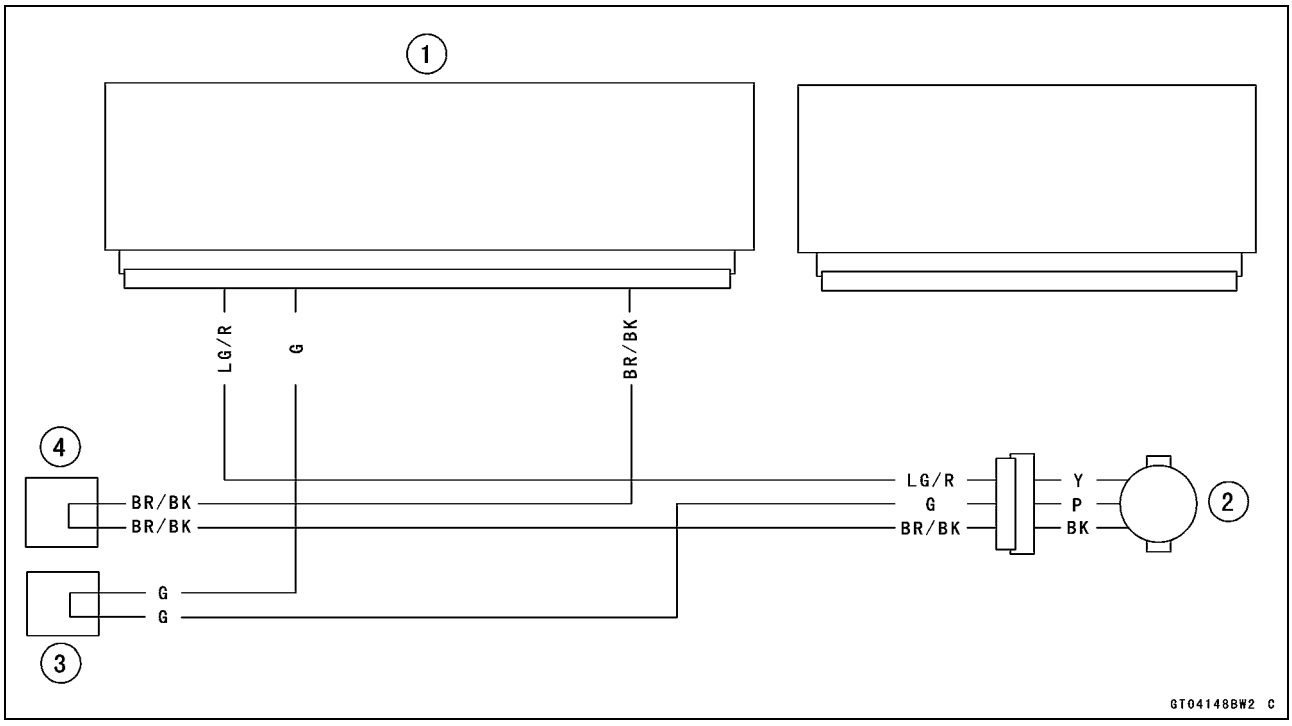
Wiring Continuity Inspection
ECU Connector [A] ←→
Speed Sensor Connector [B]
LG/R lead (ECU terminal 5) [C]
BR/BK lead (ECU terminal 22) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Speed Sensor (Service Code 24)

Speed Sensor Circuit



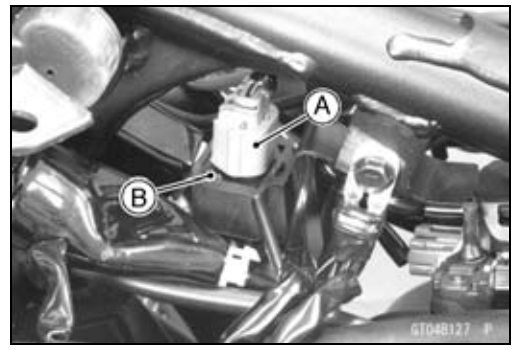
1. ECU
2. Speed Sensor
3. Water-proof Joint 4
4. Water-proof Joint 3

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Removal/Installation

NOTICE

Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.

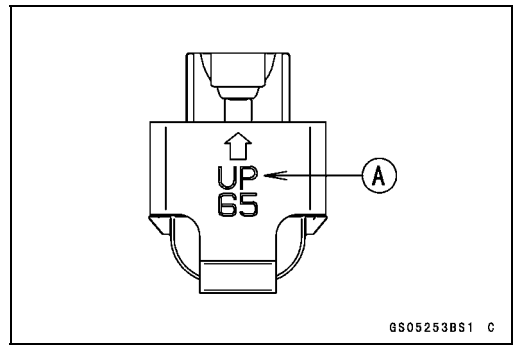


- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the connector [A] and remove the vehicle-down sensor [B] with damper.

- Installation is the reverse of removal.

○Apply grease to the vehicle-down sensor terminals.

○The UP mark [A] of the sensor should face upward.



⚠ WARNING

Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the sensor bracket.

Vehicle-down Sensor Inspection

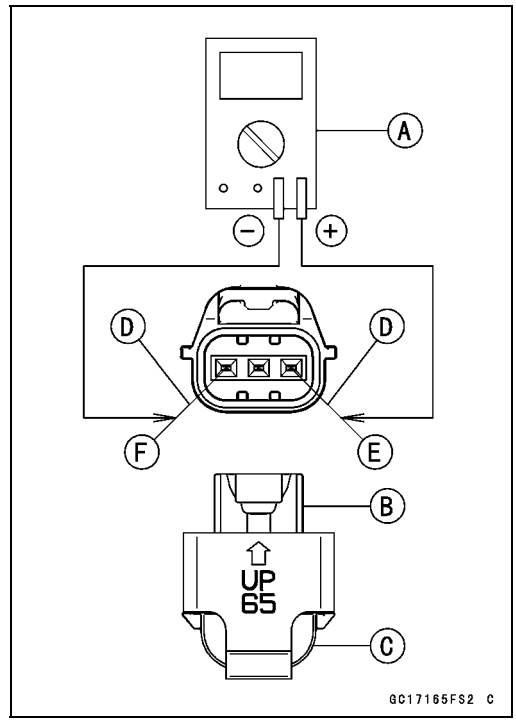
NOTE

○*Be sure the battery is fully charged.*

- Connect a digital meter [A] to the connector [B] of the vehicle-down sensor [C] with the needle adapter set [D].

Special Tool - Needle Adapter Set: 57001-1457

Vehicle-down Sensor Power Source Voltage
Connections to Sensor Connector:
Meter (+) → G lead [E]
Meter (–) → BR/BK lead [F]



- Turn the ignition switch on, and measure the power source voltage with the connector joined.

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

★If the reading of input voltage is less than the standard, check the ECU for its ground, power supply and wiring.

★If the power source is normal, check the output voltage.

Vehicle-down Sensor (Service Code 31)

● Remove the vehicle-down sensor (see Vehicle-down Sensor Removal/Installation).
○Do not disconnect the sensor connector.
● Using the needle adapter set [A], connect a digital meter [B] to the connector.

Special Tool - Needle Adapter Set: 57001-1457

Vehicle-down Sensor Output Voltage
Connections to Sensor Connector:
Meter (+) → Y/G lead [C]
Meter (–) → BR/BK lead [D]

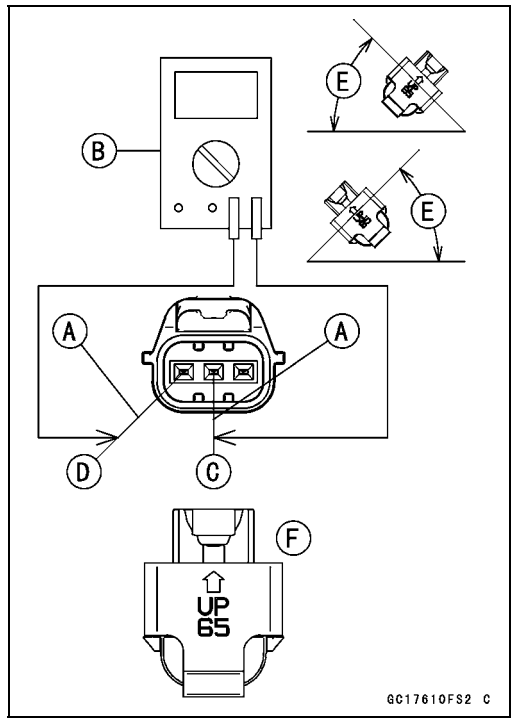
● Hold the sensor vertically.
● Turn the ignition switch on, and measure the output voltage with the connector joined.
○Tilt the sensor 60 ~ 70° or more [E] right or left, then hold the sensor almost vertical with the arrow mark pointed up [F], and measure the output voltage.

Output Voltage
Standard: with sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V
with sensor arrow mark pointed up: DC 3.55 ~ 4.45 V

NOTE

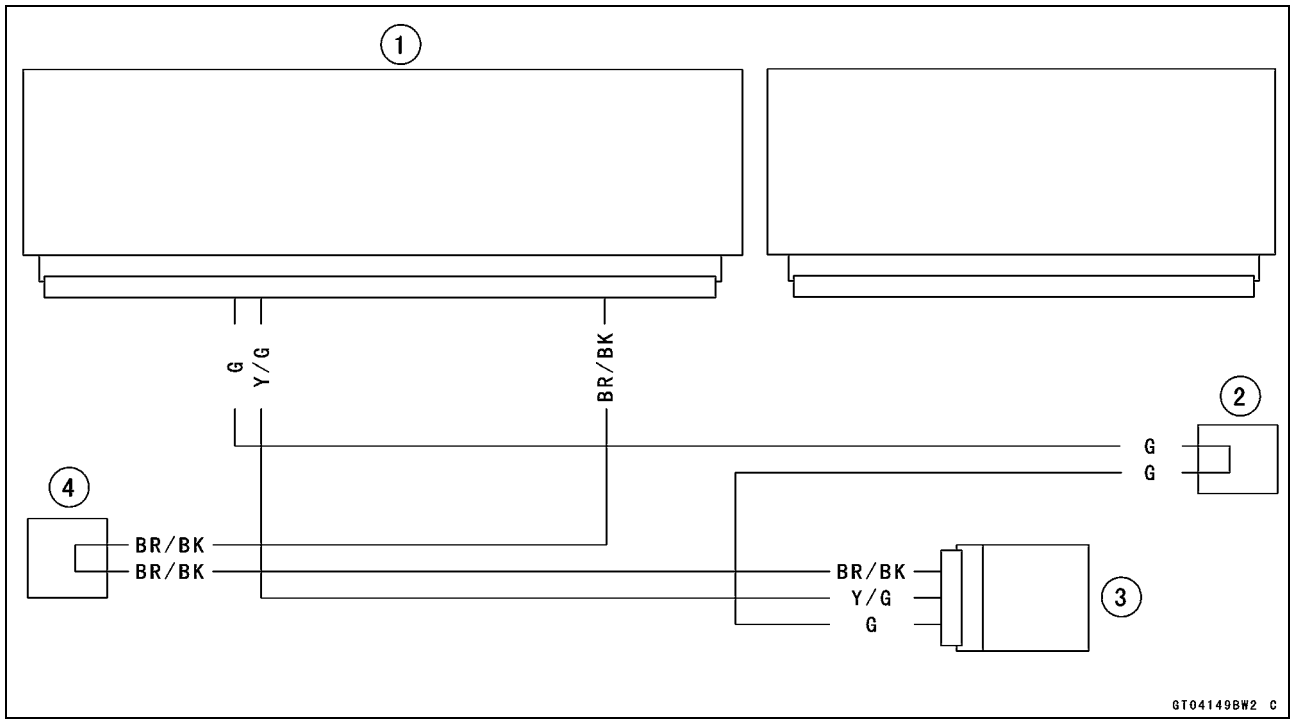
○*If you need to test again, turn the ignition switch off, and then on.*

● Turn the ignition switch off.
★If the output voltage is normal, check the wiring.
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the output voltage is out of the specified, replace the vehicle-down sensor.



Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Circuit



1. ECU
2. Water-proof Joint 4
3. Vehicle-down Sensor
4. Water-proof Joint 3

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Removal/Adjustment

NOTICE

Do not remove or adjust the subthrottle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy especially on a hard surface. Such a shock to the subthrottle sensor can damage it.

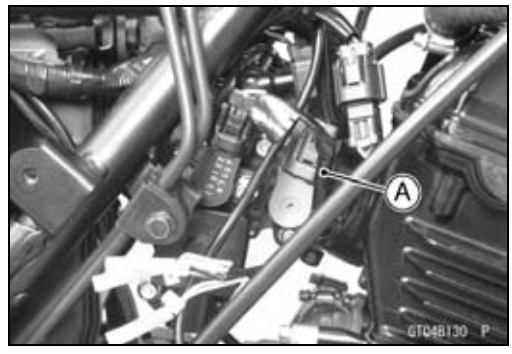
Subthrottle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Turn the ignition switch off.
- Disconnect the subthrottle sensor and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Connect a digital meter to the harness adapter leads.

Subthrottle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → BK (sensor G) lead
Digital Meter (–) → W (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Input Voltage
Standard: DC 4.75 ~ 5.25 V

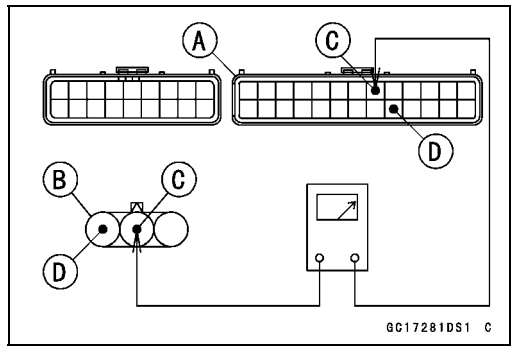
- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Subthrottle Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.



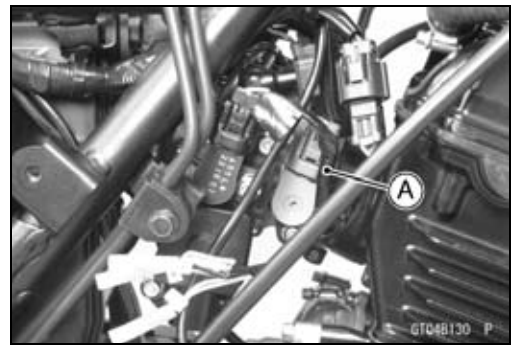
Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
G lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Output Voltage Inspection



- Measure the output voltage at the subthrottle sensor in the same way as input voltage inspection (see Subthrottle Sensor Input Voltage Inspection).

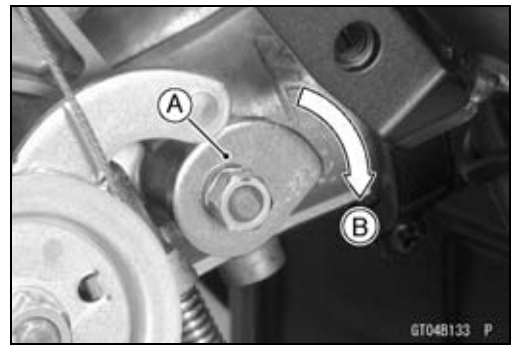
○Disconnect the subthrottle sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

- Connect a digital meter to the harness adapter leads.

Subthrottle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL/W) lead
Digital Meter (–) → W (sensor BR/BK) lead

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the subthrottle valve actuator harness connector [A].



- Turn the ignition switch on.
- Measure the output voltage when the subthrottle valve is completely closed by turning the lever [A] fully clockwise [B].

Output Voltage
Standard: DC 0.78 ~ 0.82 V at subthrottle valve full close position
DC 3.9 ~ 4.5 V at subthrottle valve full open position (for reference)

NOTE

○*Turn the lever counterclockwise, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
0.78 × 4.75 ÷ 5.00 = 0.741 V
0.82 × 4.75 ÷ 5.00 = 0.779 V
Thus, the valid range is 0.741 ~ 0.779 V

- Turn the ignition switch off.

★If the reading is out of the standard, check the subthrottle sensor resistance (see Subthrottle Sensor Resistance Inspection).

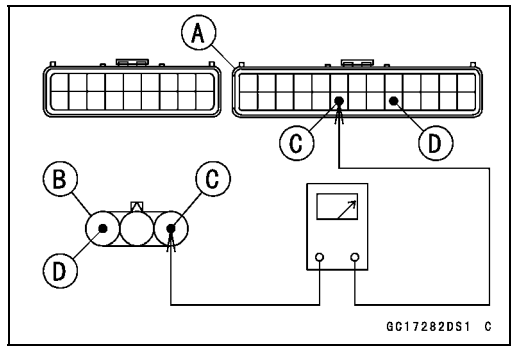
Subthrottle Sensor (Service Code 32)

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL/W lead (ECU terminal 19) [C]
BR/BK lead (ECU terminal 22) [D]

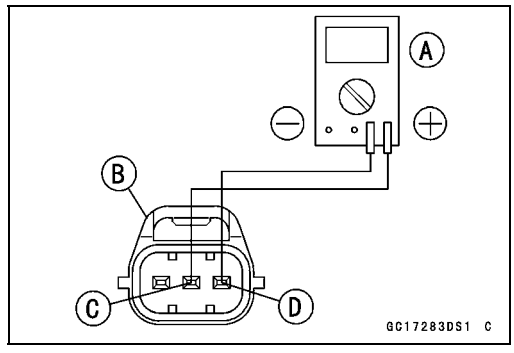


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Subthrottle Sensor Resistance Inspection

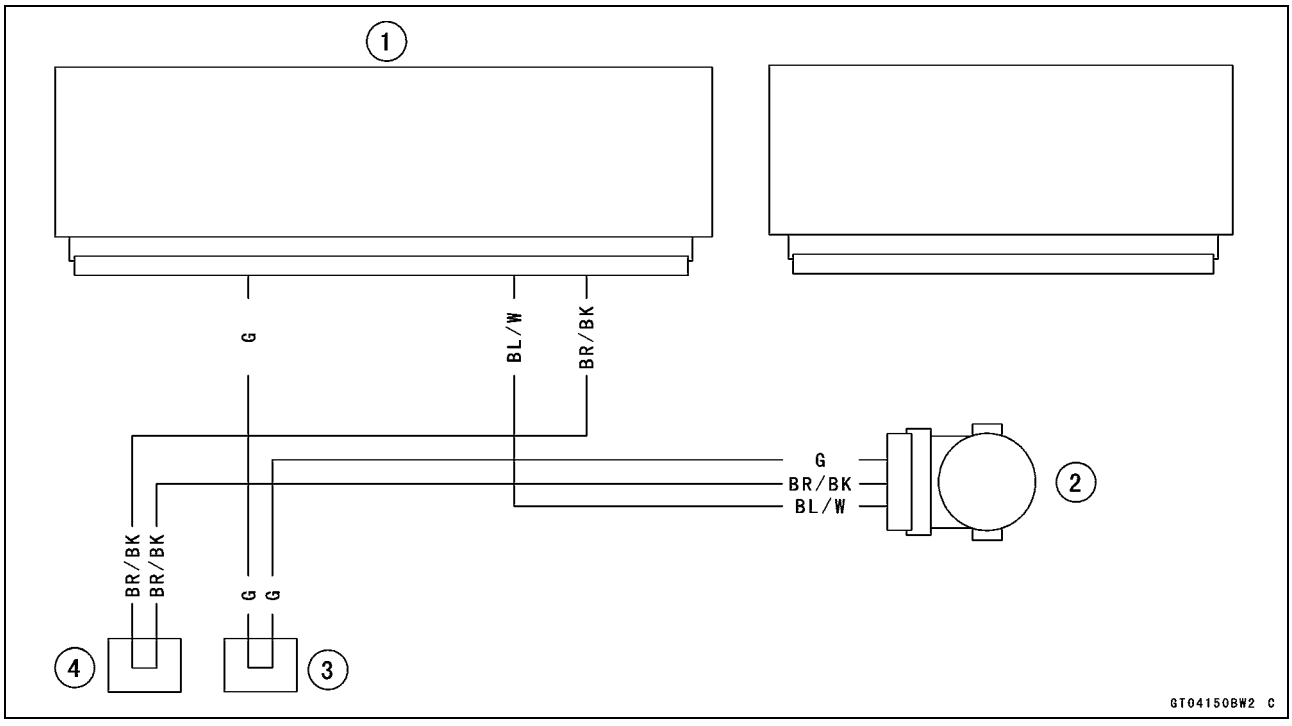
- Turn the ignition switch off.
- Disconnect the subthrottle sensor connector.
- Connect a digital meter [A] to the subthrottle sensor connector [B].
- Measure the subthrottle sensor resistance.

Subthrottle Sensor Resistance
Connections: G lead [C] ←→ BR/BK lead [D]
Standard: 4 ~ 6 kΩ



★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).
★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Subthrottle Sensor Circuit



1. ECU
2. Subthrottle Sensor
3. Water-proof Joint 4
4. Water-proof Joint 3

Oxygen Sensor - not activated (Service Code 33) (Equipped Models)

Oxygen Sensor Removal/Installation

● Refer to the Oxygen Sensor Removal/Installation in the Electrical System chapter.

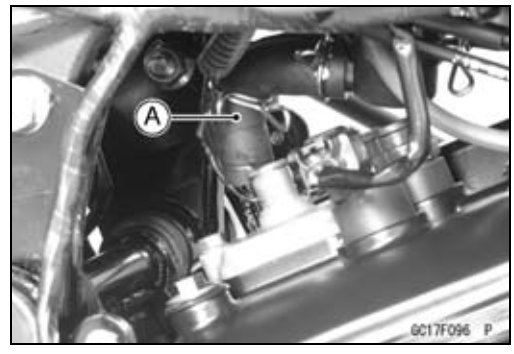
Oxygen Sensor Inspection

● Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
● Warm up the engine thoroughly until the radiator fan starts.
● Turn the ignition switch off.
● Disconnect the oxygen sensor lead connector and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

● Connect a digital meter to the harness adapter leads.

Oxygen Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → BL (sensor BL) lead
Digital Meter (−) → BR (sensor W) lead



● Disconnect the hose [A] from the air suction valve cover.
○Do not disconnect the air switching valve connector.

● Install the suitable plug [A] on the fitting of the air suction valve cover to shut off the secondary air.
● Start the engine and let it idle.
● Measure the output voltage with the connector joined.

Output Voltage (with Plug)
Standard: DC 0.7 V or more

● Next, remove the plug from the fitting [A] with idling.
● Measure the output voltage with the connector joined.

Output Voltage (without Plug)
Standard: DC 0.2 V or less

● Turn the ignition switch off.

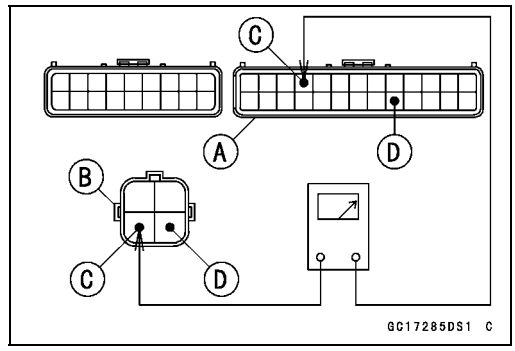
Oxygen Sensor - not activated (Service Code 33) (Equipped Models)

★If the reading is out of the standard (with plug: DC 0.7 V or more, without plug: DC 0.2 V or less), remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

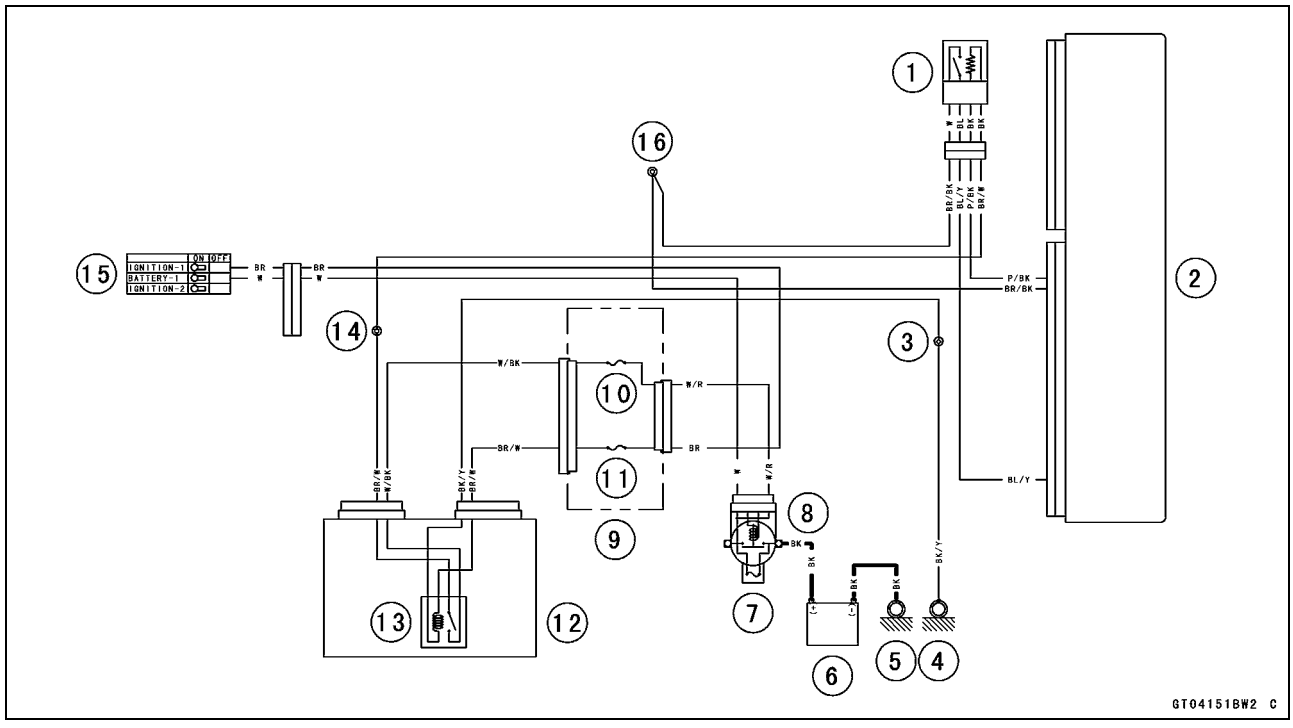
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
BL/Y lead (ECU terminal 4) [C]
BR/BK lead (ECU terminal 22) [D]



★If the wiring is good, replace the sensor.
★If the reading is within the standard (with plug: DC 0.7 V or more, without plugs: DC 0.2 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Oxygen Sensor - not activated (Service Code 33) (Equipped Models)

Oxygen Sensor Circuit



1. Oxygen Sensor
2. ECU
3. Water-proof Joint 1
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Water-proof Joint 6
15. Ignition Switch
16. Water-proof Joint 3

Stick Coils #1, #2 (Service Code 51, 52)

Stick Coil #1: Service Code 51
Stick Coil #2: Service Code 52

Stick Coil Removal/Installation

● Refer to the Stick Coil Removal/Installation in the Electrical System chapter.

Stick Coil Primary Winding Resistance Inspection

● Refer to the Stick Coil Inspection in the Electrical System chapter.

★If the reading is within the standard, check the input voltage (see Stick Coil Input Voltage Inspection).

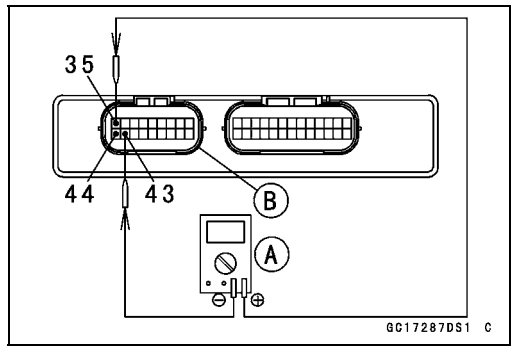
Stick Coil Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

● Turn the ignition switch off.
● Remove the ECU (see ECU Removal).
○Do not disconnect the ECU connectors.
● Connect a digital meter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457



Stick Coil Input Voltage
Connections to ECU Connector:
For Stick Coil #1
Digital Meter (+) → BK lead (terminal 35)
Digital Meter (–) → BK/Y lead (terminal 43)
For Stick Coil #2
Digital Meter (+) → BK/O lead (terminal 44)
Digital Meter (–) → BK/Y lead (terminal 43)

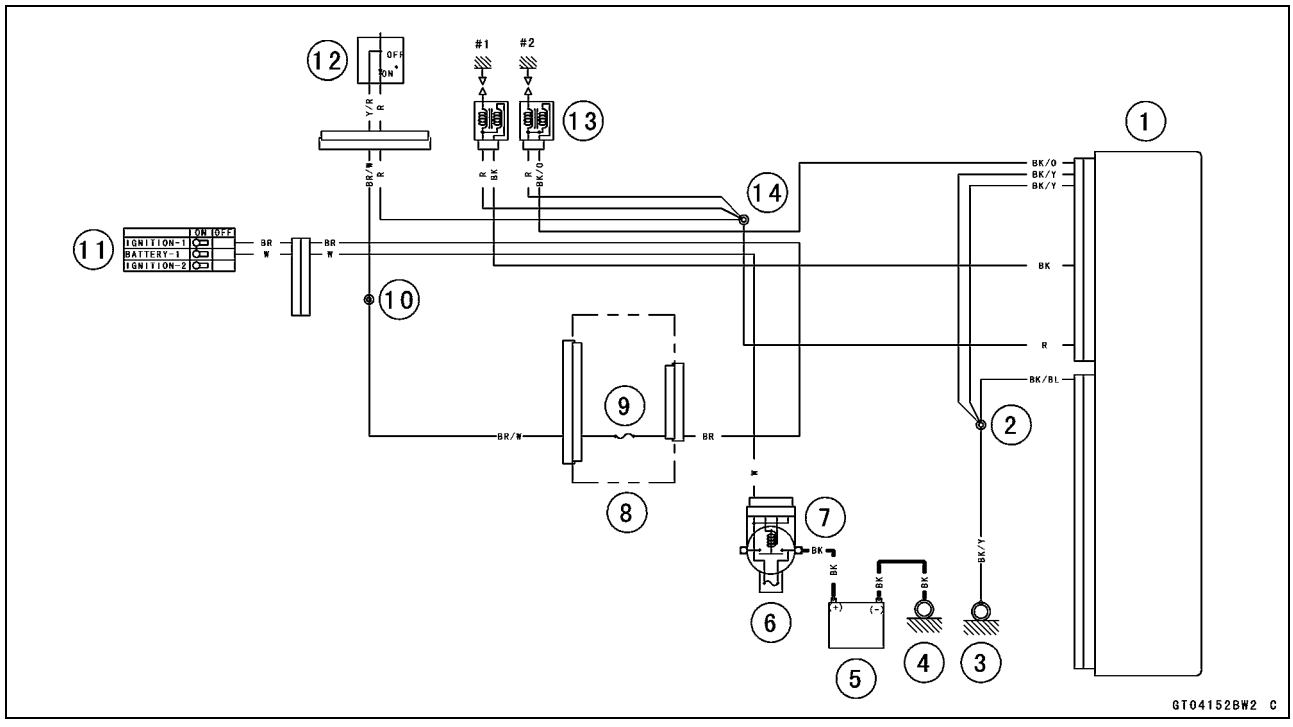
● Measure the input voltage to each primary winding of the stick coils with the engine stopped and with the connectors joined.
● Turn the engine stop switch to run position.
● Turn the ignition switch on.

Input Voltage
Standard: Battery Voltage

● Turn the ignition switch off.
★If the input voltage is out of the standard, check the wiring for continuity (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the input voltage is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Stick Coils #1, #2 (Service Code 51, 52)

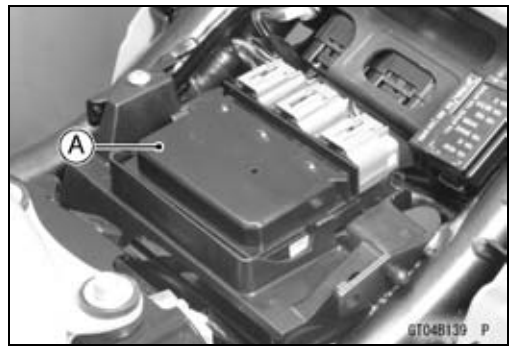
Stick Coil Circuit



1. ECU
2. Water-proof Joint 2
3. Frame Ground
4. Engine Ground
5. Battery 12 V 8 Ah
6. Main Fuse 30 A
7. Starter Relay
8. Fuse Box 1
9. Ignition Fuse 10 A
10. Water-proof Joint 7
11. Ignition Switch
12. Engine Stop Switch
13. Stick Coils
14. Water-proof Joint 5

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Removal/Installation



○The radiator fan relay is built in the relay box [A].

● Refer to the Relay Box Removal in the Electrical System chapter.

Radiator Fan Relay Inspection

● Refer to the Relay Circuit Inspection in the Electrical System chapter.

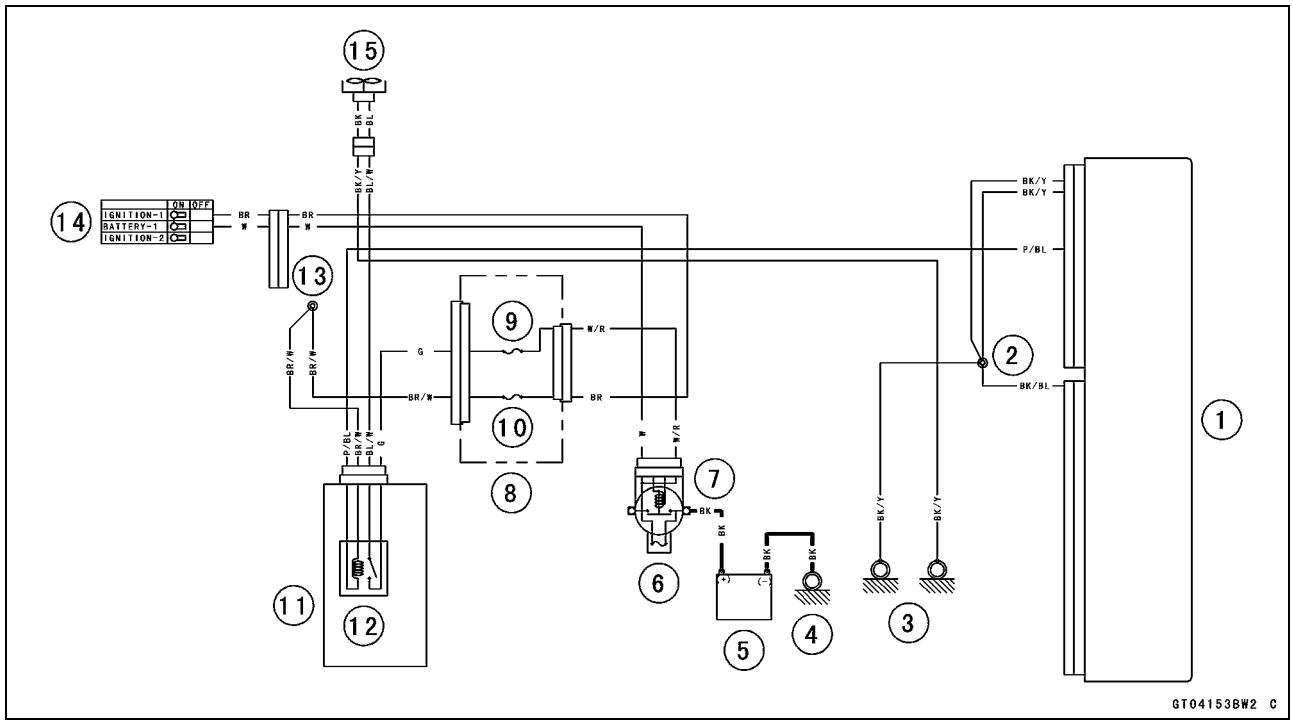
★If the radiator fan relay is normal, check the wiring for continuity (see wiring diagram in this section).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Circuit



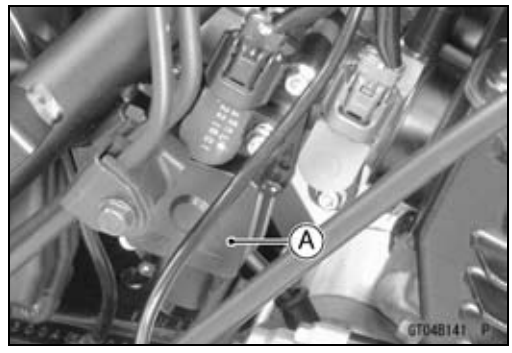
1. ECU
2. Water-proof Joint 2
3. Frame Ground
4. Engine Ground
5. Battery 12 V 8 Ah
6. Main Fuse 30 A
7. Starter Relay
8. Fuse Box 1
9. Fan Fuse 10 A
10. Ignition Fuse 10 A
11. Relay Box
12. Radiator Fan Relay
13. Water-proof Joint 7
14. Ignition Switch
15. Fan Motor

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Removal

NOTICE

Do not remove the subthrottle valve actuator [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy especially on a hard surface. Such a shock to the subthrottle valve actuator can damage it.



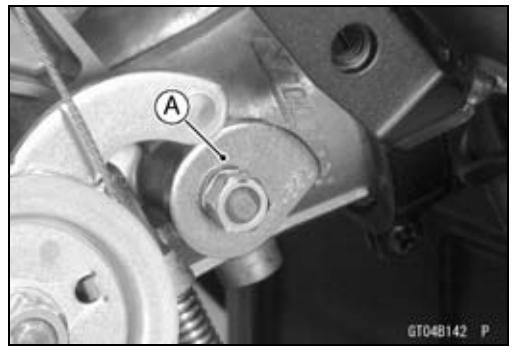
Subthrottle Valve Actuator Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Turn the ignition switch on.
- Check to see that the subthrottle valves lever [A] open and close smoothly.
- Turn the ignition switch off.

★If the subthrottle valves do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).

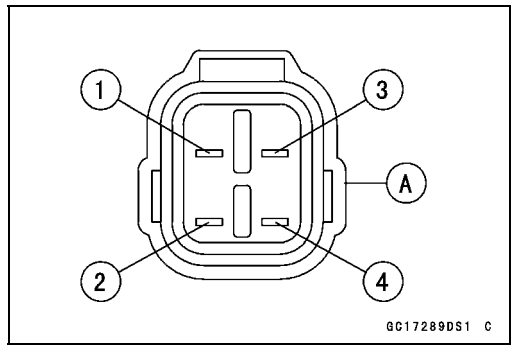


Subthrottle Valve Actuator Resistance Inspection

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the subthrottle valve actuator connector [A].

- Connect a digital meter to the subthrottle valve actuator connector [A].
- Measure the subthrottle valve actuator resistance.

Subthrottle Valve Actuator Resistance
Connections: **BK lead [1] ←→ P lead [2]**
G lead [3] ←→ W/BL lead [4]
Standard: **About 5.2 ~ 7.8 Ω**



★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

★If the reading is within the standard, check the input voltage (see Subthrottle Valve Actuator Input Voltage Inspection).

Subthrottle Valve Actuator (Service Code 62)

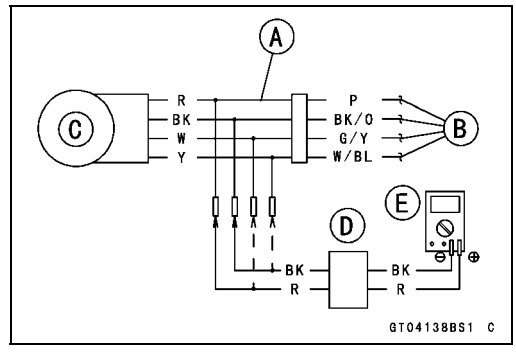
Subthrottle Valve Actuator Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the fuel tank (see Fuel Tank Removal).
- Turn the ignition switch off.
- Disconnect the subthrottle valve actuator connector and connect the harness adapter [A] between these connectors as shown.
  Main Harness [B]
  Subthrottle Valve Actuator [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect the peak voltage adapter [D] and a digital meter [E] to the harness adapter leads.

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Subthrottle Valve Actuator Input Voltage
Connections to Adapter:

(I) Digital Meter (+) → R (actuator P) lead
Digital Meter (–) → BK (actuator BK) lead
(II) Digital Meter (+) → W (actuator W/BL) lead
Digital Meter (–) → Y (actuator G) lead

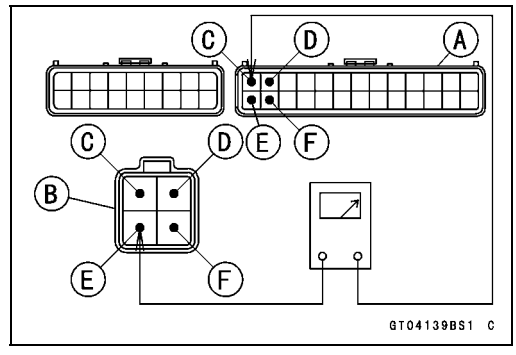
- Measure the actuator input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Input Voltage
Standard: About DC 11.5 ~ 13.5 V

- Turn the ignition switch off.

★If the reading is in specification, but the actuator does not operate, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connectors.



Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and actuator connectors.

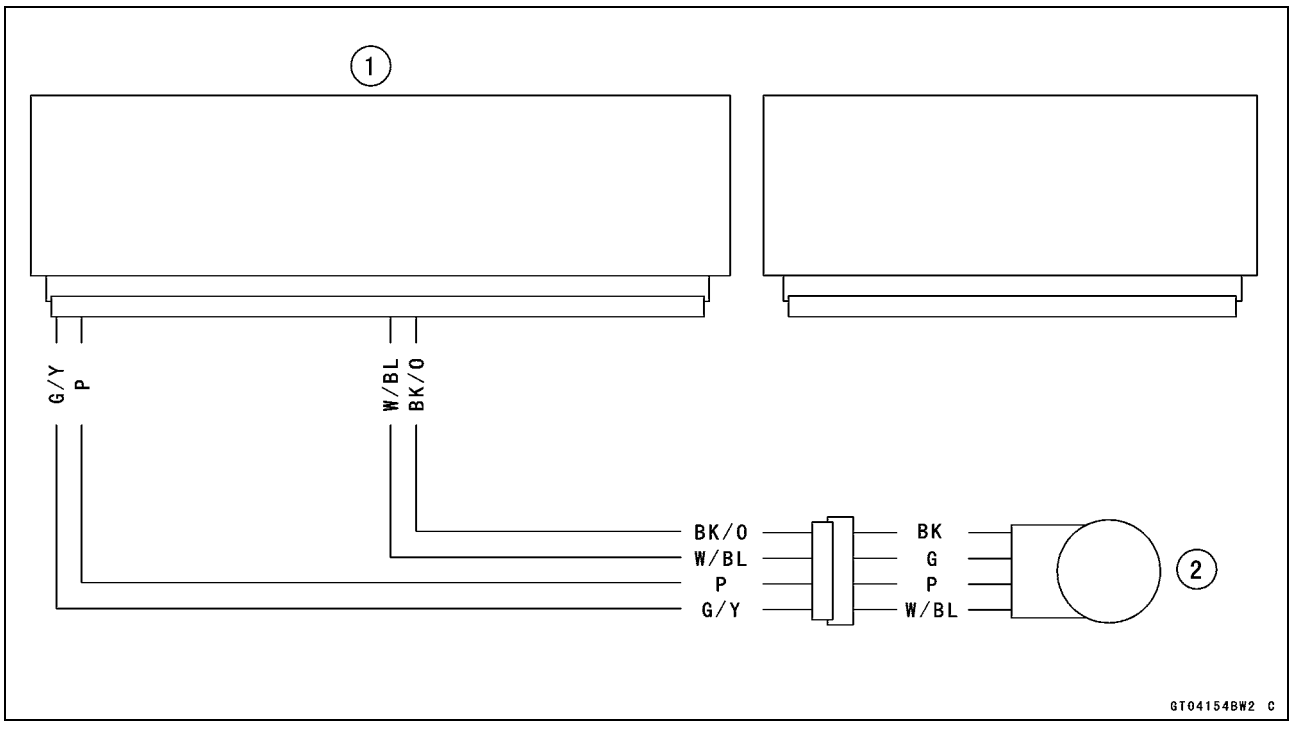
Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Valve Actuator Connector [B]
W/BL lead (ECU terminal 1) [C]
BK/O lead (ECU terminal 2) [D]
G/Y lead (ECU terminal 14) [E]
P lead (ECU terminal 15) [F]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Circuit



1. ECU
2. Subthrottle Valve Actuator

Air Switching Valve (Service Code 64)

Air Switching Valve Removal/Installation

● Refer to the Air Switching Valve Removal/Installation in the Engine Top End chapter.

Air Switching Valve Inspection

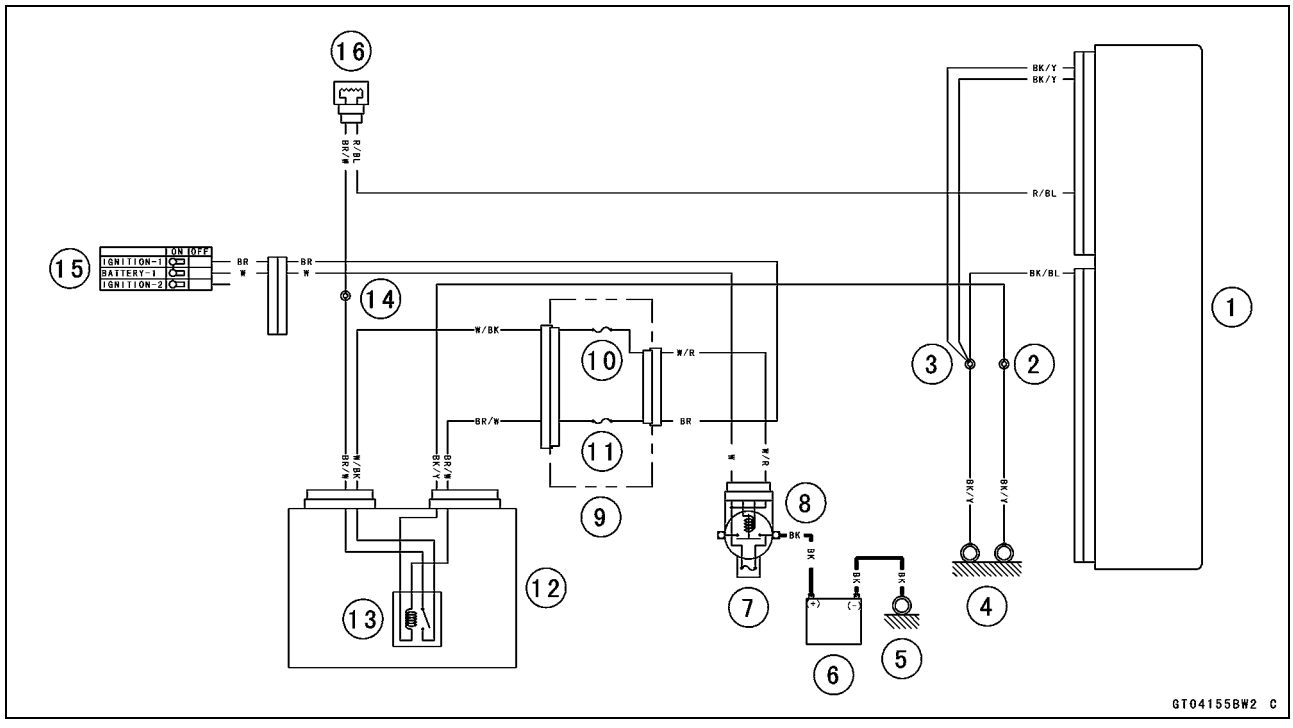
● Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

★If the air switching valve is normal, check the wiring for continuity (see wiring diagram in this section).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Air Switching Valve Circuit



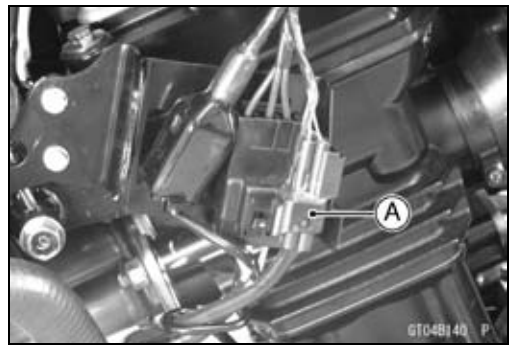
1. ECU
2. Water-proof Joint 1
3. Water-proof Joint 2
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15 A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Water-proof Joint 6
15. Ignition Switch
16. Air Switching Valve

Oxygen Sensor Heater (Service Code 67) (Equipped Models)

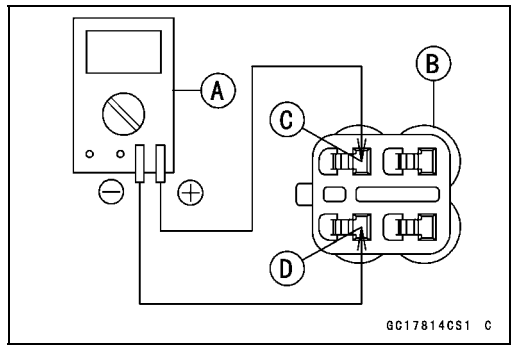
Oxygen Sensor Heater Removal/Installation

The oxygen sensor heater is built in the oxygen sensor. So, the heater itself can not be removed. Remove the oxygen sensor (see Oxygen Sensor Removal in the Electrical System chapter).

Oxygen Sensor Heater Resistance Inspection



- Turn the ignition switch off.
- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector [A].

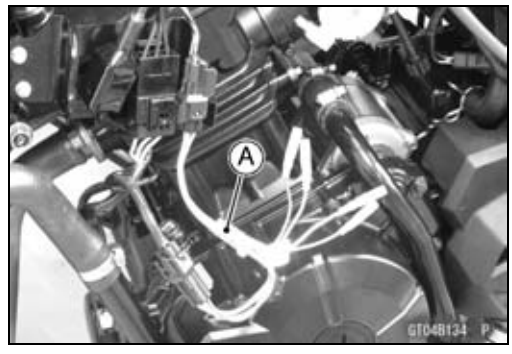


- Connect a digital meter [A] to the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

Oxygen Sensor Heater Resistance
Connections: BK lead [C] ←→ BK lead [D]
Standard: 11.7 ~ 14.5 Ω at 20°C (68°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, check the power source voltage (see Oxygen Sensor Heater Power Source Voltage Inspection).

Oxygen Sensor Heater Power Source Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect the oxygen sensor lead connector and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

- Connect a digital meter to the harness adapter lead.

Oxygen Sensor Power Source Voltage
Connections to Adapter:
Digital Meter (+) → P (sensor BK) lead
Digital Meter (–) → Battery (–) terminal

- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Power Source Voltage
Standard: Battery Voltage

- Turn the ignition switch off.

★If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation).
★If the reading is out of the standard, check the following.
FI fuse 15 A and ignition fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Power Source Wiring (see wiring diagram in this section)

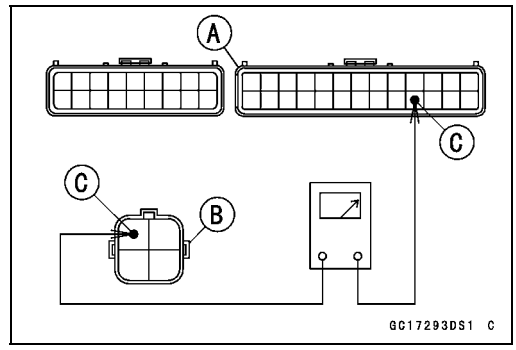
Oxygen Sensor Heater (Service Code 67) (Equipped Models)

★If the fuse and wiring are good, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

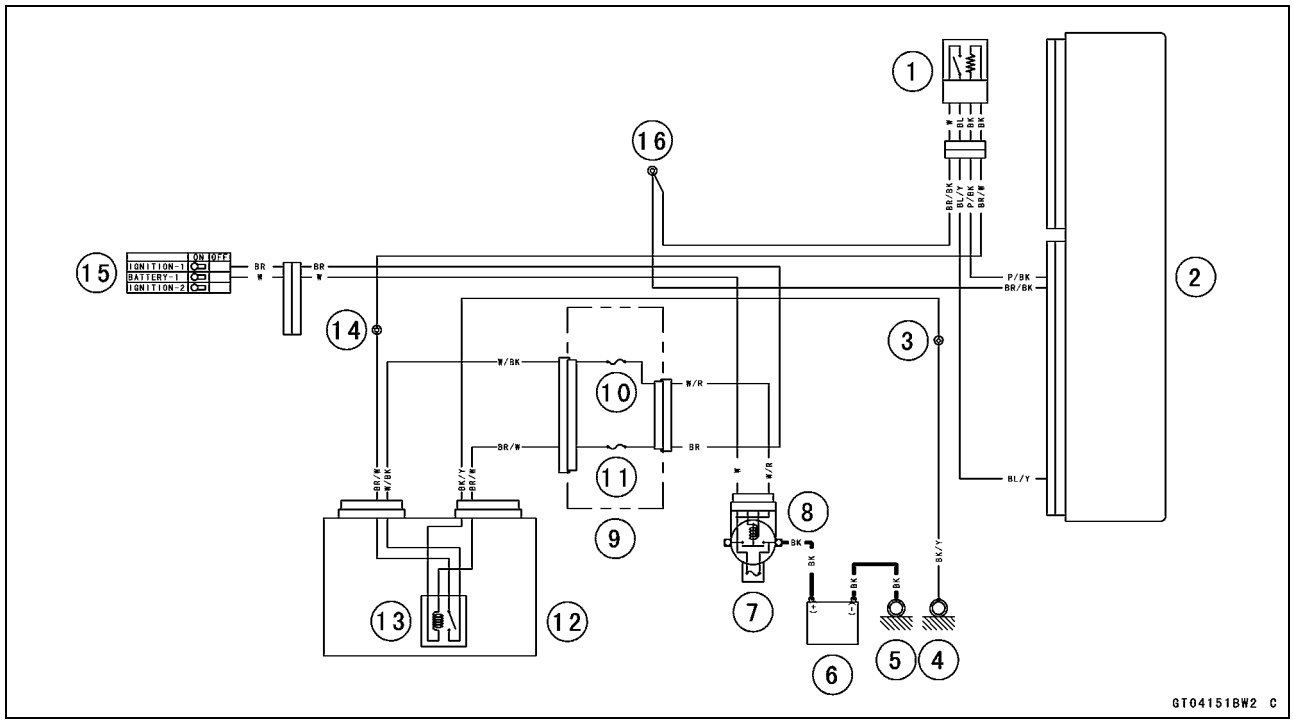
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
P/BK lead (ECU terminal 23) [C]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Oxygen Sensor Circuit



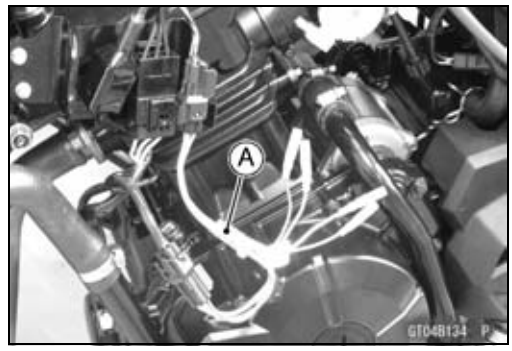
1. Oxygen Sensor
2. ECU
3. Water-proof Joint 1
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Water-proof Joint 6
15. Ignition Switch
16. Water-proof Joint 3

Oxygen Sensor - Incorrect Output Voltage (Service Code 94) (Equipped Models)

Oxygen Sensor Removal/Installation

- Refer to the Oxygen Sensor Removal/Installation in the Electrical System chapter.

Oxygen Sensor Inspection

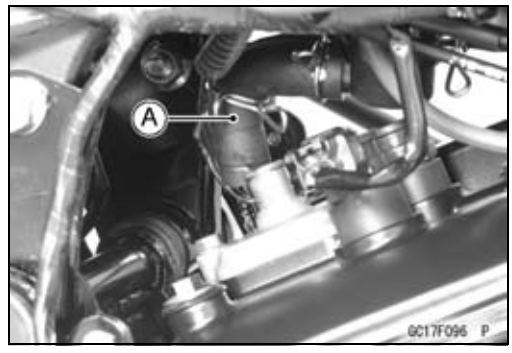


- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Warm up the engine thoroughly until the radiator fan starts.
- Turn the ignition switch off.
- Disconnect the oxygen sensor lead connector and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

- Connect a digital meter to the harness adapter leads.

Oxygen Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → BL (sensor BL) lead
Digital Meter (−) → BR (sensor W) lead



- Disconnect the hose [A] from the air suction valve cover.

○Do not disconnect the air switching valve connector.

- Install the suitable plug [A] on the fitting of the air suction valve cover to shut off the secondary air.
- Start the engine and let it idle.
- Measure the output voltage with the connector joined.

Output Voltage (with Plug)
Standard: DC 0.7 V or more

Oxygen Sensor - Incorrect Output Voltage (Service Code 94) (Equipped Models)

- Next, remove the plug from the fitting [A] with idling.
- Measure the output voltage with the connector joined.

Output Voltage (without Plug)
Standard: DC 0.2 V or less

- Turn the ignition switch off.

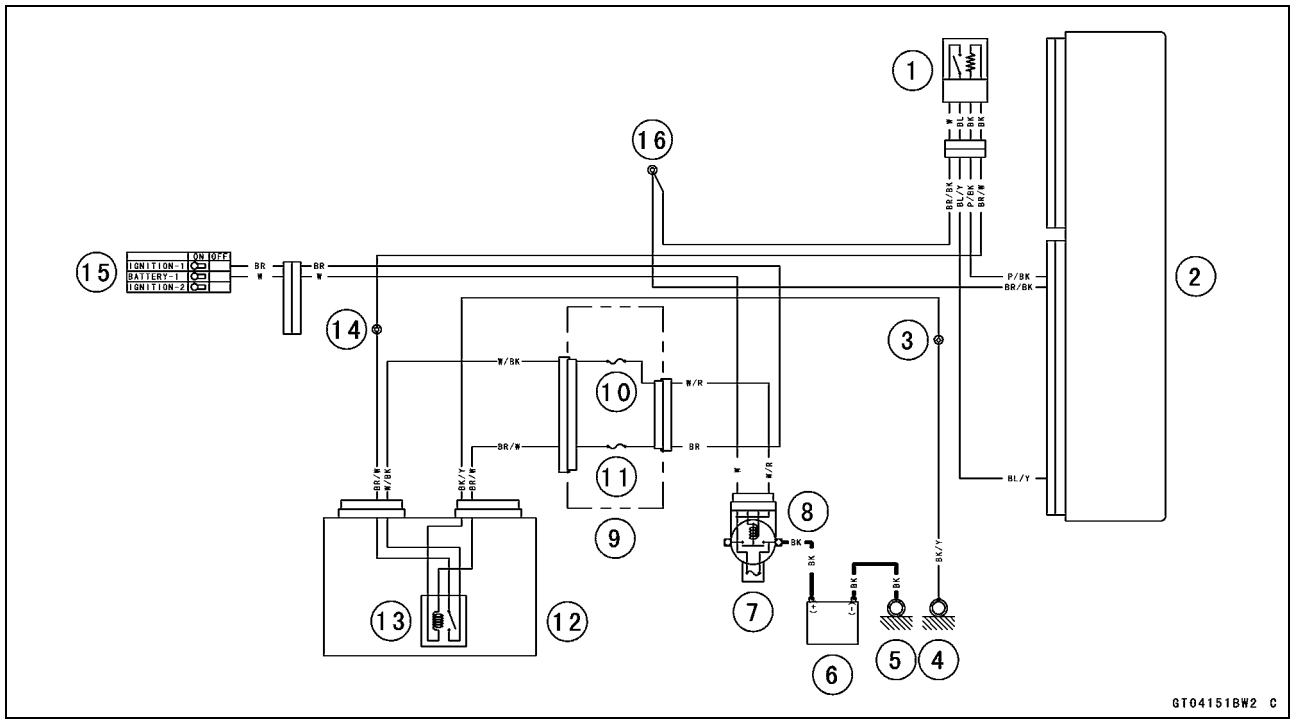
★If the reading is out of the standard (with plug: DC 0.7 V or more, without plug: DC 0.2 V or less), check the following.
Fuel Pressure (see Fuel Pressure Inspection)
Fuel Injector (see Fuel Injectors section)

★If the fuel pressure and fuel injectors are good, replace the sensor.

★If the reading is within the standard (with plug: DC 0.7 V or more, without plug: DC 0.2 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

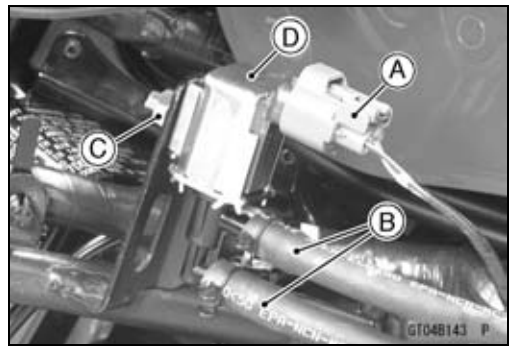
Oxygen Sensor Circuit



1. Oxygen Sensor
2. ECU
3. Water-proof Joint 1
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Water-proof Joint 6
15. Ignition Switch
16. Water-proof Joint 3

Purge Valve (Service Code 3A) (CAL Model)

Purge Valve Removal/Installation



- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the purge valve connector [A] and tubes [B].
- Remove the purge valve mounting nut [C] and purge valve [D].
- Installation is the reverse of removal.

○Tighten:

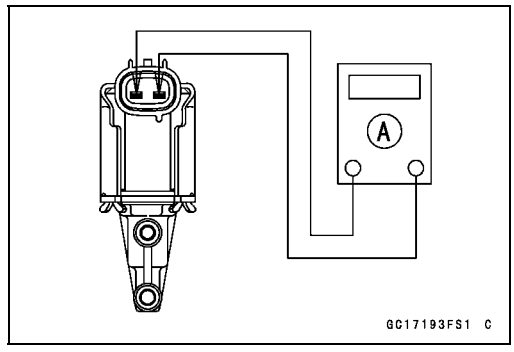
Torque - Purge Valve Mounting Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

○Run the tubes correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Purge Valve Inspection

- Remove the purge valve (see Purge Valve Removal/Installation).
- Set the hand tester [A] to the × 1 Ω range and connect it to the purge valve terminals as shown in the figure.

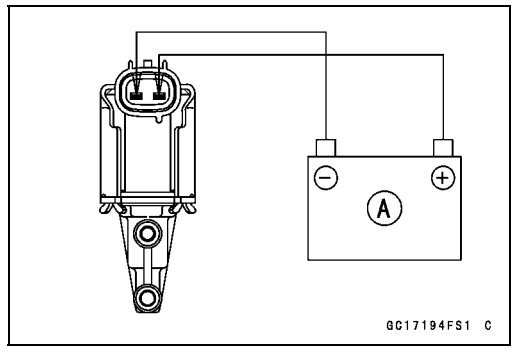
Special Tool - Hand Tester: 57001-1394



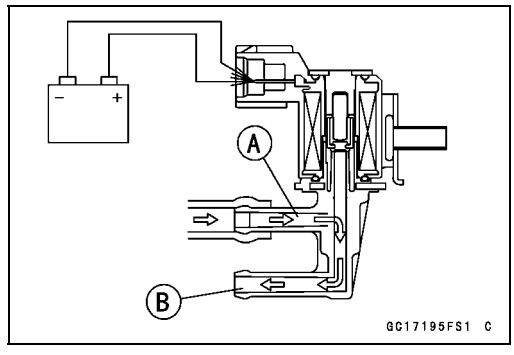
Purge Valve Resistance
Standard: 30 ~ 34 Ω at 20°C (68°F)

★If the resistance reading is out of the specified value, replace it with a new one.

- Connect the 12 V battery [A] to the purge valve terminals as shown.



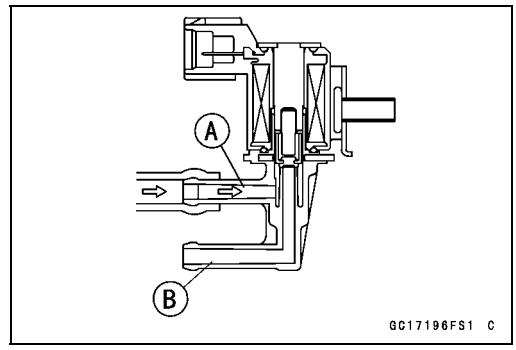
- Blow the air to the intake air duct [A], and make sure that the air flows from the outlet air duct [B].



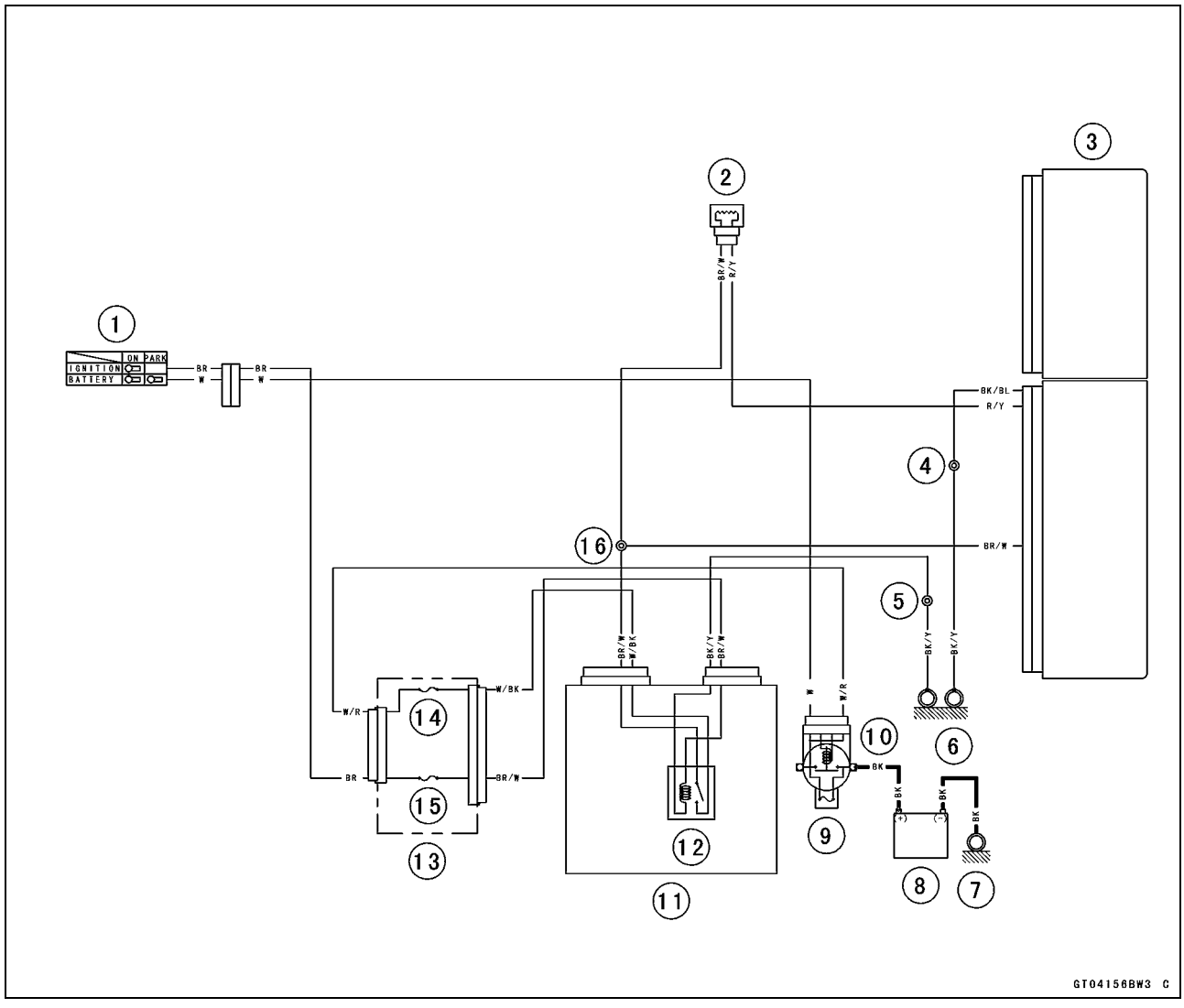
Purge Valve (Service Code 3A) (CAL Model)

- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure that the air does not flow from the outlet air duct [B].

★If the purge valve dose not operate as described, replace it with a new one.



Purge Valve Circuit



1. Ignition Switch
2. Purge Valve
3. ECU
4. Water-proof Joint 1
5. Water-proof Joint 2
6. Frame Ground
7. Engine Ground
8. Battery 12 V 8 Ah
9. Main Fuse 30 A
10. Starter Relay
11. Relay Box
12. ECU Main Relay
13. Fuse Box 1
14. FI Fuse 15 A
15. Ignition Fuse 10 A
16. Water-proof Joint 6

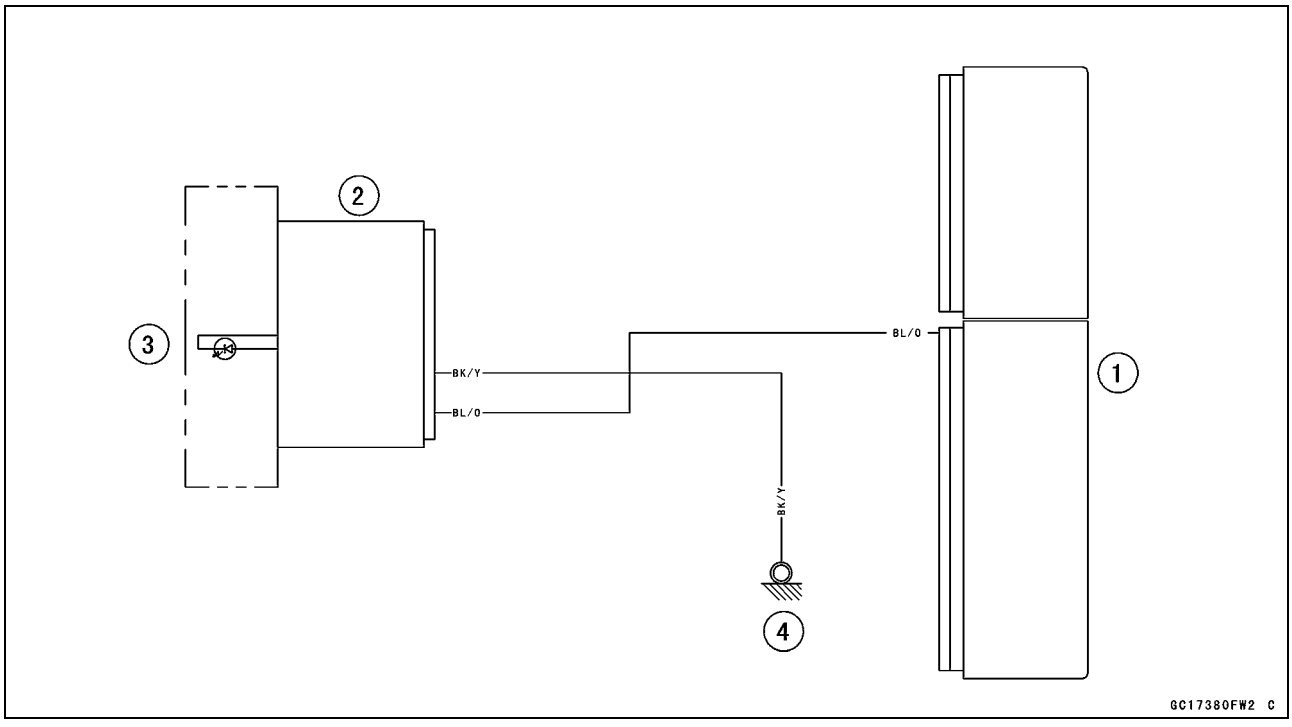
Yellow Engine Warning Indicator Light (LED)

Yellow Engine Warning Indicator Light (LED) Inspection

○In this model, the yellow engine warning indicator light (LED) goes on or blinks by the data sent from the ECU.

● Refer to the Meter Unit Inspection in the Electrical System chapter.

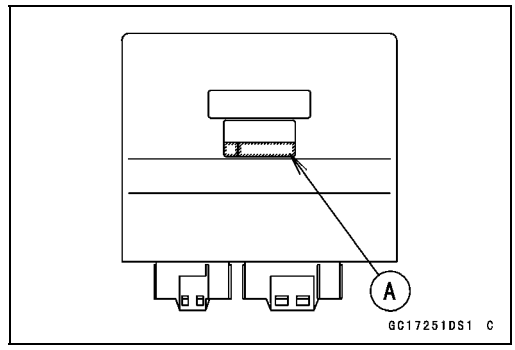
Yellow Engine Warning Indicator Light (LED) Circuit for DFI System



1. ECU
2. Meter Unit
3. Yellow Engine Warning Indicator Light (LED)
4. Frame Ground

ECU

ECU Identification



○Most countries have their own regulations, so each ECU has different characteristic. So, do not confuse ECU with each other and use only the ECU for your model. Otherwise, the motorcycle cannot clear the regulation.

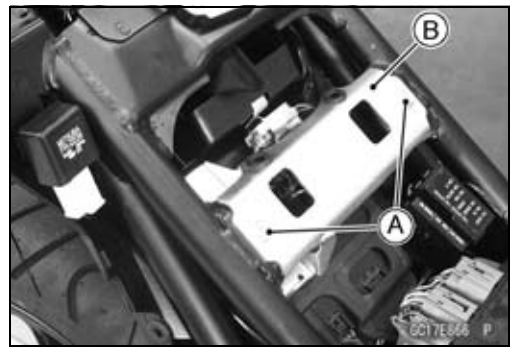
ECU Identification

Part Number [A]	Specification
21175-0773	WVTA (FULL AB-2), IN
21175-0793	US, CA, CO
21175-0794	AU
21175-0795	BR
21175-0854	CAL

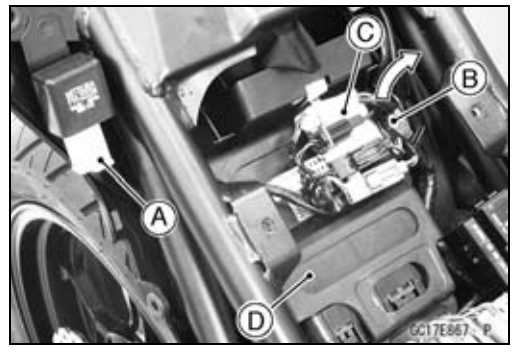
ECU Removal

NOTICE

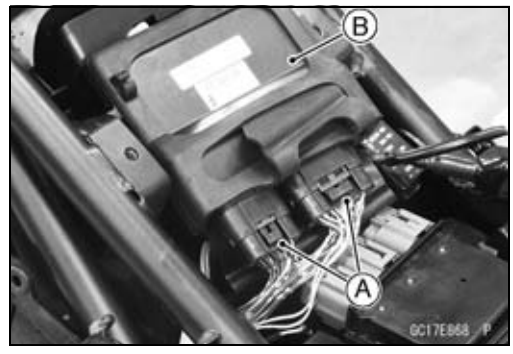
Never drop the ECU especially on a hard surface. Such a shock to the ECU can damage it.



- Remove:
  Seat Covers (see Seat Cover Removal in the Frame chapter)
  Bolts [A]
  Bracket [B]



- Disconnect the connector [A] from the turn signal relay.
- Remove the screw [B].
- Without disconnecting the connectors, move the bracket together with connector [C] aside and pull up the ECU [D] with rubber protector.



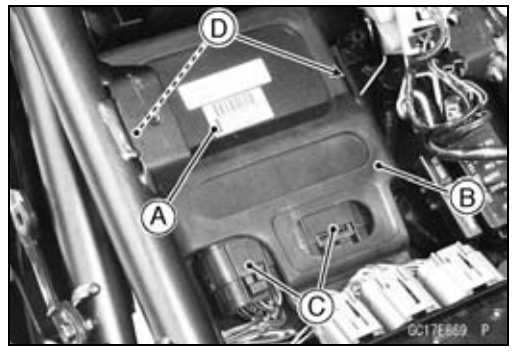
- Make sure that the ignition switch is turned off.
- Disconnect the ECU connectors [A] from the ECU [B].

NOTICE

To protect the ECU from the electrical surge, disconnect the ECU connector while the ignition switch is turned off.

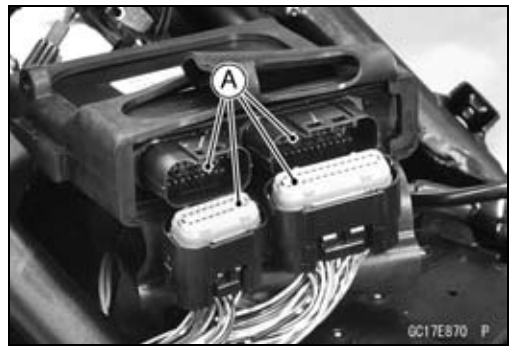
ECU

ECU Installation



- Install the ECU [A] into the rubber protector [B].
- Connect the ECU connectors [C].
- Insert the slits of the rubber protector to the projections [D] of the rear fender.
- Install the connector/bracket on the ECU and tighten the screw.
- Connect the connector to the turn signal relay.
- Install the removed parts (see appropriate chapters).

ECU Power Supply Inspection



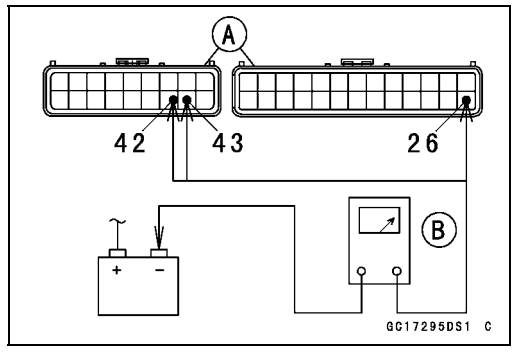
- Remove the ECU (see ECU Removal).
- Visually inspect the ECU connectors.

★If the connector is clogged with mud or dust, blow it off with compressed air.

- Visually inspect the terminals [A] of the ECU connectors.

★If the terminals of the main harness connectors are damaged, replace the main harness.

★If the terminals of the ECU connectors are damaged, replace the ECU.



- Turn the ignition switch off.
- Disconnect the ECU connectors [A].
- Set the hand tester [B] to the × 1 Ω range and check the following wiring for continuity.

Special Tool - Hand Tester: 57001-1394

ECU Grounding Continuity Inspection

Connections:

(I) BK/Y leads (ECU terminal 42 or 43)	**←→**	**Battery (–) Terminal**
(II) BK/BL leads (ECU terminal 26)	**←→**	**Battery (–) Terminal**
(III) Engine Ground	**←→**	**Battery (–) Terminal**

Criteria: 0 Ω

★If no continuity, check the connectors, the engine ground lead, or main harness, and repair or replace them if necessary.

ECU

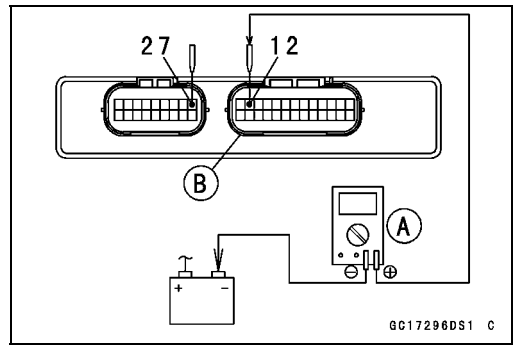
★If the wiring is good, check the power source voltage of the ECU.

NOTE

○*Be sure the battery is fully charged.*

- Connect the ECU connectors.
- Connect a digital meter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457



ECU Power Supply Inspection

Connections:

(I) Digital Meter (+) → Terminal 12 (BR/W)

Digital Meter (–) → Battery (–) terminal

(II) Digital Meter (+) → Terminal 27 (W/BK)

Digital Meter (–) → Battery (–) terminal

Ignition Switch off:

Terminal 12 (BR/W): 0 V

Terminal 27 (W/BK): Battery Voltage

Ignition Switch on:

Both: Battery Voltage

★If the reading is out of the specification, check the following.

Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

FI Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

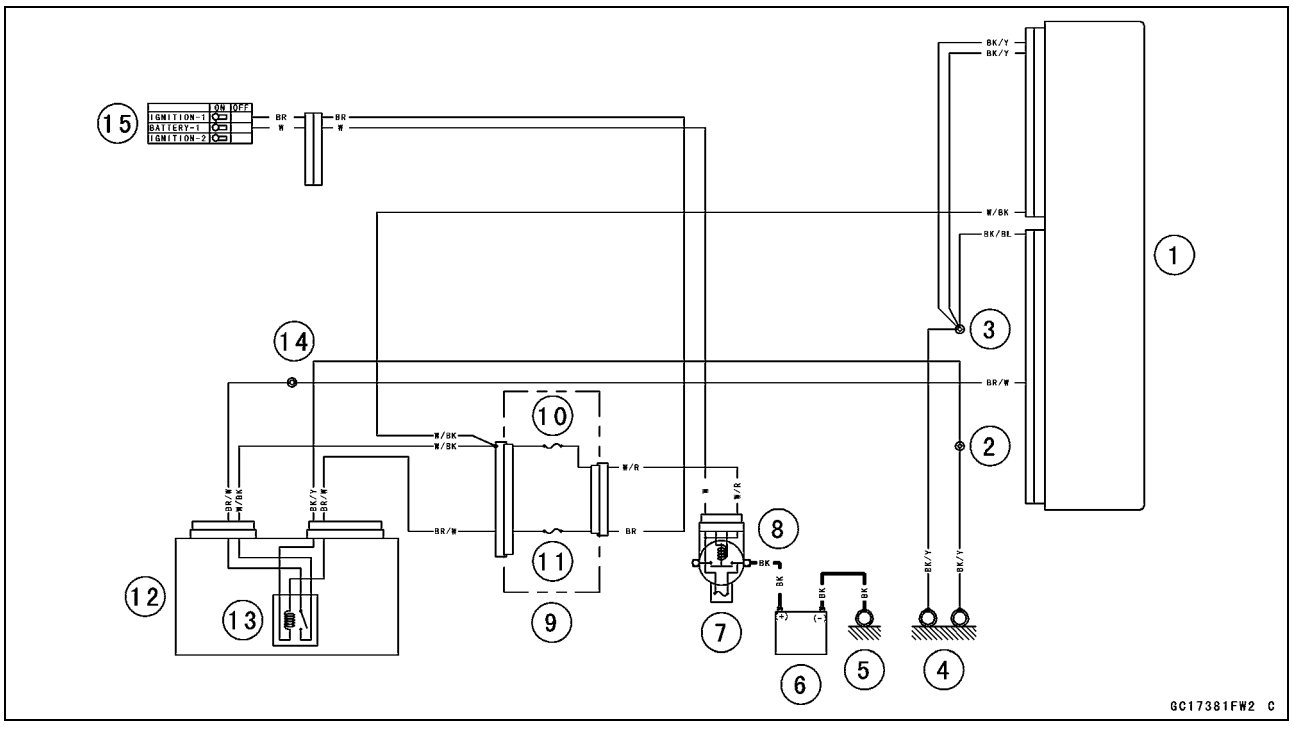
ECU Main Relay (see Relay Circuit Inspection in the Electrical System chapter)

Power Source Wiring (see wiring diagram in this section)

★If the fuse, wiring and relay are good, replace the ECU (see ECU Removal/Installation).

ECU

ECU Power Source Circuit



1. ECU
2. Water-proof Joint 1
3. Water-proof Joint 2
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15 A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Water-proof Joint 8
15. Ignition Switch

DFI Power Source

FI Fuse Removal

- Refer to the FI Fuse 15 A Removal in the Electrical System chapter.

FI Fuse Installation

★If a fuse fails during operation, inspect the DFI system to determine the cause, and then replace it with a new fuse of proper amperage.

- Refer to the Fuse Installation in the Electrical System chapter.

FI Fuse Inspection

- Refer to the Fuse Inspection in the Electrical System chapter.

ECU Main Relay Removal/Installation

○The ECU main relay is built in the relay box [A].

- Refer to the Relay Box Removal in the Electrical System chapter.

ECU Main Relay Inspection

- Refer to the Relay Circuit Inspection in the Electrical System chapter.

Fuel Line

Fuel Pressure Inspection

NOTE

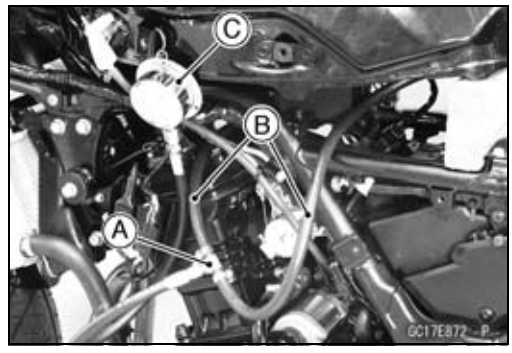
○*Be sure the battery is fully charged.*

● Remove:
Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

○Be sure to place a piece of cloth around the outlet pipes of the fuel pump and the throttle body assy.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.



● Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel supply pipes of the fuel pump and throttle body assy.
● Secure the fuel hoses with the clamps.
● Connect the pressure gauge [C] to the fuel pressure gauge adapter.

Special Tools - Oil Pressure Gauge, 5 kgf/cm²: 57001-125
Fuel Pressure Gauge Adapter: 57001-1593
Fuel Hose: 57001-1607

⚠ WARNING

Fuel is extremely flammable and can be explosive under certain conditions resulting in serious injury or death. Do not try to start the engine with the fuel hoses disconnected.

● Connect the fuel pump lead connector.
● Turn the engine stop switch run position.
● Turn the ignition switch on. The fuel pump will turn 3 seconds, and then stop.

NOTE

○*Turn the ignition switch on and inspect the fuel line leakage after installing the special tools.*

NOTICE

Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

● Start the engine, and let it idle.
● Measure the fuel pressure with the engine idling.

Fuel Pressure (with Engine Idling)
Standard: 294 kPa (3.0 kgf/cm², 43 psi)

Fuel Line

NOTE

○*The gauge needle will fluctuate. Read the pressure at the average of the maximum and minimum indications.*

- Turn the ignition switch off.

★If the fuel pressure is much higher than specified, the fuel pressure regulator in the fuel pump have been clogged or stuck. Replace the fuel pump (see Fuel Pump section).

★If the fuel pressure is much lower than specified, check the following.

Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)

Amount of Fuel Flow (see Fuel Flow Rate Inspection)

- After above checks, measure the fuel pressure again.
- Remove the fuel pressure gauge, hoses and adapter.
- Install:

Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

Fuel Tank (see Fuel Tank Installation)

- Start the engine and check for fuel leakage.

Fuel Flow Rate Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool: 57001-1607) and a measuring cylinder.

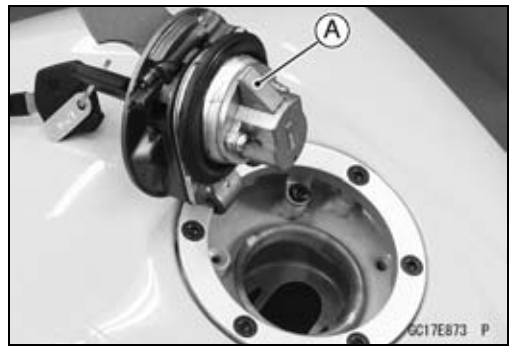
Special Tool - Fuel Hose: 57001-1607

- Remove the fuel tank bolts (see Fuel Tank Removal).

Fuel Line

- Open the fuel tank cap [A] to release the pressure in the tank.
- Disconnect the fuel hose from the fuel pump (see Fuel Tank Removal).

○Be sure to place a piece of cloth around the fuel supply pipe of the fuel pump.



⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.

- Connect the prepared fuel hose [A] to the outlet pipe of the fuel pump.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].

⚠ WARNING

Wipe off spilled out fuel immediately. Be sure to hold the measuring cylinder vertical.

- Close the fuel tank cap.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

NOTICE

Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Measure the discharge for 3 seconds.

○Repeat this operation several times.

Amount of Fuel Flow
Standard: 50 mL (1.69 US oz.) or more for 3 seconds

- Turn the ignition switch off.

★If the fuel flow is much less than the specified, replace the fuel pump (see Fuel Pump Removal/Installation).

- Install the fuel tank (see Fuel Tank Installation).
- Start the engine and check for fuel leakage.

Fuel Pump

Fuel Pump Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

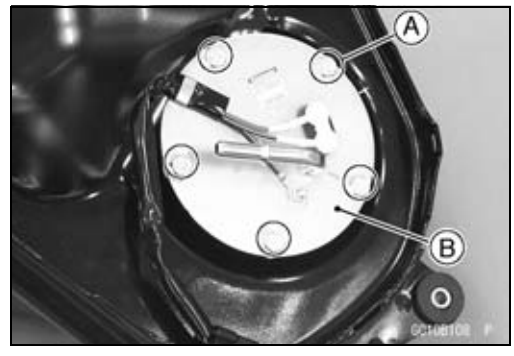
NOTICE

Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal).

○Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the outlet pipe of the fuel pump.

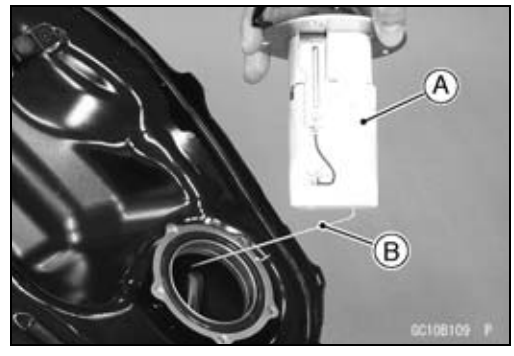
- Turn the fuel tank upside down.
- Remove the fuel pump bolts [A] and pull up the fuel pump [B].



NOTICE

Do not pull the lead of the fuel pump. If they are pulled, the lead terminals may be damaged.

- Remove the fuel pump unit [A] from the fuel tank.



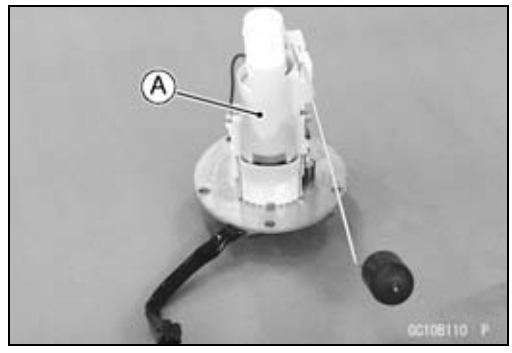
NOTICE

Be careful not to bend the float arm [B] during the fuel pump removal, it may cause incorrect indication of the fuel level gauge.

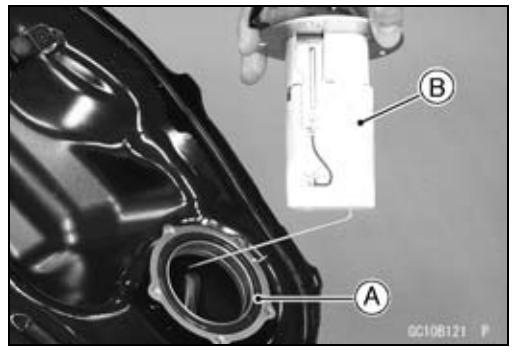
○Do not try to disassemble the fuel pump unit.

Fuel Pump

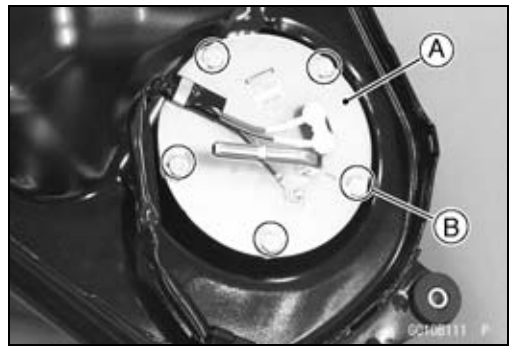
Fuel Pump Installation



- Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.



- Replace the fuel pump gasket [A] with a new one.
- Install the fuel pump [B] into the fuel tank.



- Position the fuel pump [A] as shown.
- Apply a non-permanent locking agent to the threads of the fuel pump bolts [B].
- Tighten the fuel pump bolts to a snug fit, tighten them alternating diagonally.

Torque - Fuel Pump Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Check the fuel leakage after installation.

Fuel Pump Operation Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the engine stop switch to run position.
- Turn the ignition switch on and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch off.

★If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection).

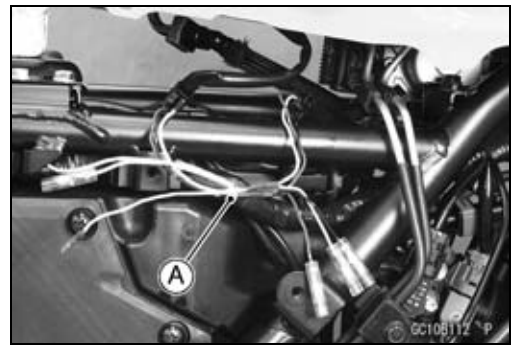
Fuel Pump

Fuel Pump Operating Voltage Inspection

NOTE

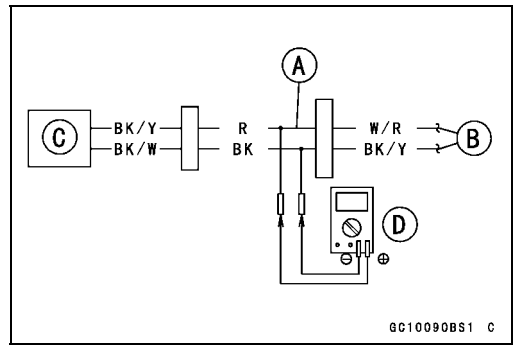
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the fuel tank bolts (see Fuel Tank Removal).
- Disconnect the fuel pump lead connector and connect the harness adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Pump [C]



Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the harness adapter leads.



Fuel Pump Operating Voltage
Connections to Adapter:
Digital Meter (+) → R (pump BK/Y) lead
Digital Meter (–) → BK (pump BK/W) lead

- Measure the operating voltage with engine stopped and with the connector joined.
- Turn the engine stop switch run position.
- Turn the ignition switch on.

Operating Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

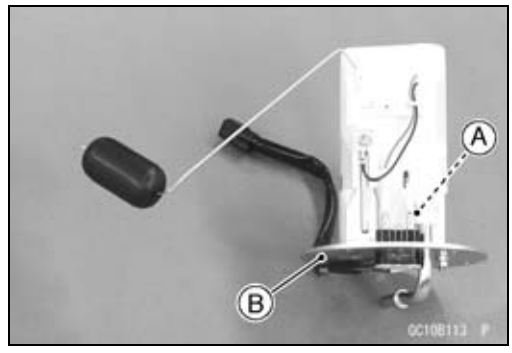
- Turn the ignition switch off.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the ECU main relay and fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the main relay and pump relay are normal, check the wiring for continuity (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

Fuel Pump

Pressure Regulator Removal

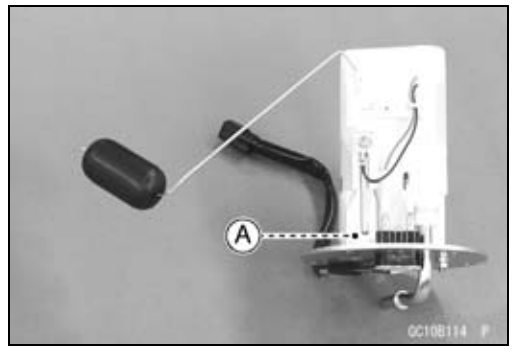
○The pressure regulator [A] is built into the fuel pump unit [B] and can not be removed.



Fuel Filter Cleaning

○The fuel filter [A] are built into the fuel pump unit and can not be cleaned or checked.

★If the fuel filter is suspected of clogging or being damaged, replace it with the fuel pump as a set.



Fuel Pump Relay Removal/Installation

○The fuel pump relay is built in the relay box [A].

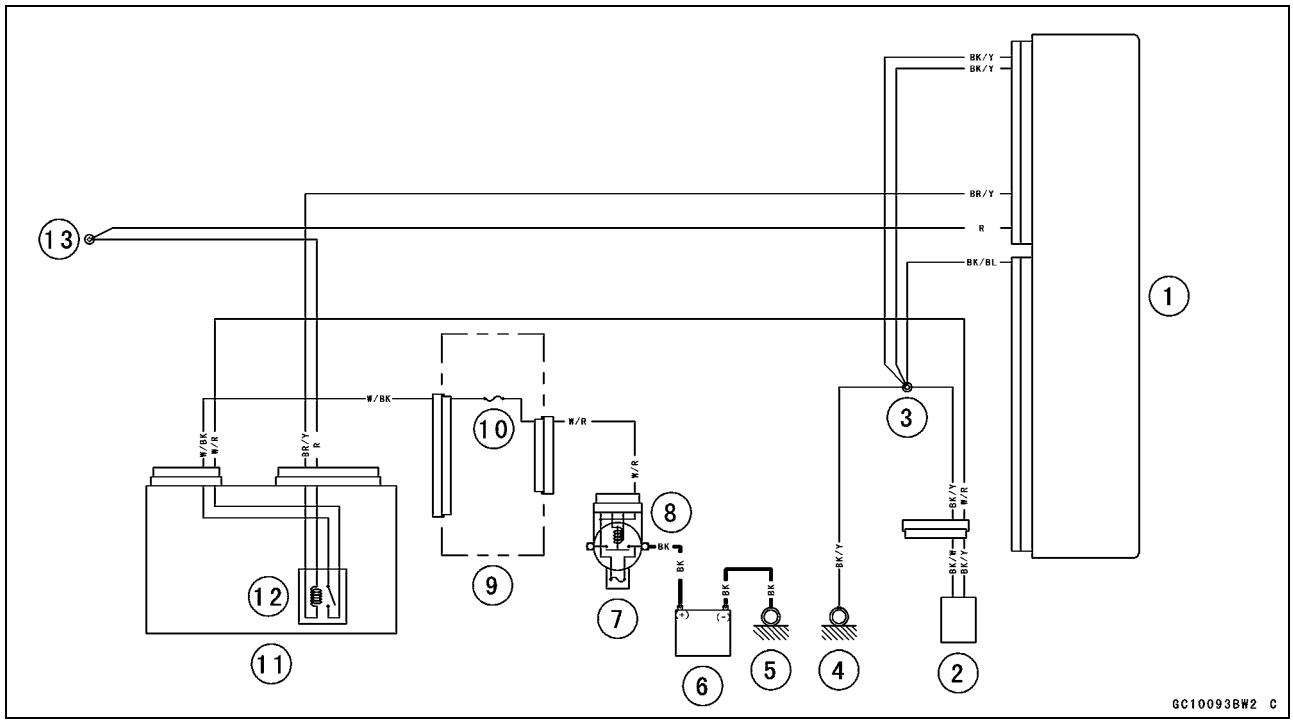
● Refer to the Relay Box Removal in the Electrical System chapter.

Fuel Pump Relay Inspection

● Refer to the Relay Circuit Inspection in the Electrical System chapter.

Fuel Pump

Fuel Pump Circuit



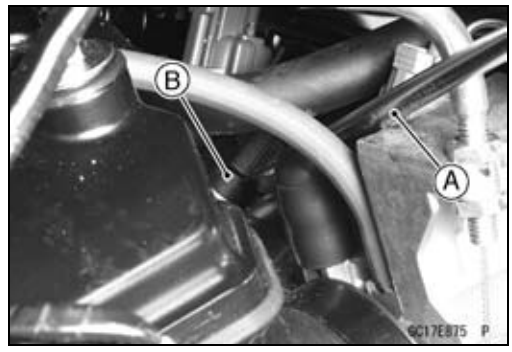
1. ECU
2. Fuel Pump
3. Water-proof Joint 2
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15 A
11. Relay Box
12. Fuel Pump Relay
13. Water-proof Joint 5

Fuel Injectors

Fuel Injector Removal/Installation

● Refer to the Throttle Body Assy Disassembly/Assembly.

Fuel Injector Audible Inspection

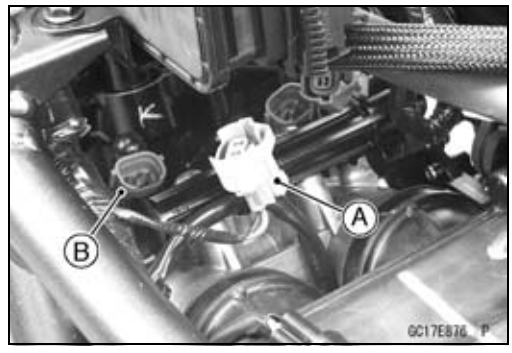


NOTE

○*Be sure the battery is fully charged.*

● Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
● Start the engine, and let it idle.
● Apply the tip of a screwdriver [A] to the fuel injector [B]. Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.
○A sound scope can also be used.
○The click interval becomes shorter as the engine speed rises.
● Do the same for the other fuel injector.
★If all the fuel injectors click at a regular intervals, the fuel injectors are normal.
● Turn the ignition switch off.
★If any fuel injector does not click, check the fuel injector resistance (see Fuel Injector Resistance Inspection).

Fuel Injector Resistance Inspection



● Remove the fuel tank (see Fuel Tank Removal).
● Disconnect the injector connector [A].
● Connect a digital meter to the terminals of the injector [B].
● Measure the fuel injector resistance.

Fuel Injector Resistance
Connections:
For Fuel Injector #1
W/R ←→ BL/BK terminal
For Fuel Injector #2
W/R ←→ BL/R terminal

Standard: About 11.7 ~ 12.3 Ω at 20°C (68°F)

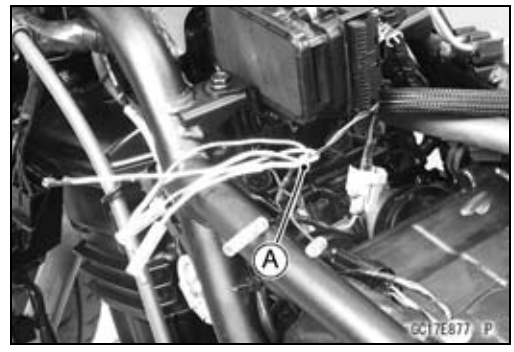
★If the reading is out of the standard, replace the injector.
★If the reading is within the standard, check the power source voltage (see Fuel Injector Power Source Voltage Inspection).

Fuel Injectors

Fuel Injector Power Source Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

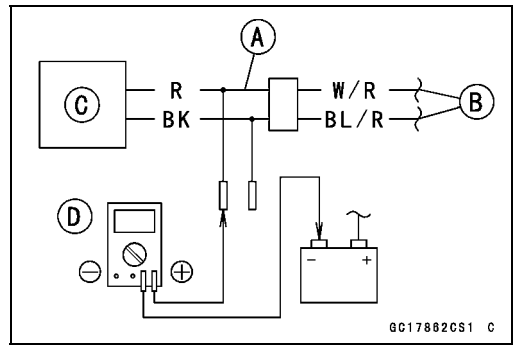


- Remove the fuel tank (see Fuel Tank Removal).
- Turn the ignition switch off.
- Disconnect the injector connector and connect the harness adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Injector #1 [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the harness adapter leads.

Fuel Injector Power Source Voltage
Connections to Adapter:
For Fuel Injector #1, #2
Digital Meter (+) → R (injector W/R) lead
Digital Meter (–) → Battery (–) terminal



- Measure the power source voltage with the engine stopped.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

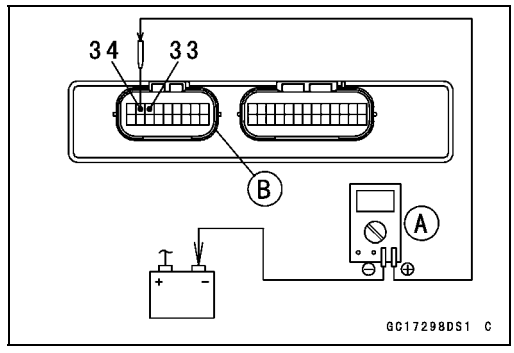
Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the ECU main relay and pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the main relay and pump relay are normal, check the power source wiring (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, check the output voltage (see Fuel Injector Output Voltage Inspection).

Fuel Injectors

Fuel Injector Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the ECU (see ECU Removal).

○Do not disconnect the ECU connector.

- Connect a digital meter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Fuel Injector Output Voltage
Connections to ECU Connector:
For Fuel Injector #1
Digital Meter (+) → BL/BK lead (ECU terminal 34)
Digital Meter (–) → Battery (–) terminal
For Fuel Injector #2
Digital Meter (+) → BL/R lead (ECU terminal 33)
Digital Meter (–) → Battery (–) terminal

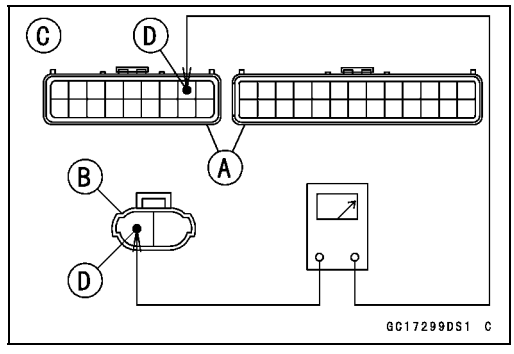
- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

Output Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

★If the reading is in specification, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



★If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tster: 57001-1394

○Disconnect the ECU and injector connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→ Fuel Injector Connector [B]
For Fuel Injector #1 [C]
BL/BK lead (ECU terminal 34) [D]
For Fuel Injector #2
BL/R lead (ECU terminal 33)

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Fuel Injectors

Fuel Injector Fuel Line Inspection

● Remove:
Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

○Be sure to place a piece of cloth around the delivery pipes of the fuel pump and the throttle body assy.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

● Check the injector fuel line for leakage as follows.

○Connect a commercially available vacuum/pressure pump [A] to the nipple of the delivery pipe [B] with the fuel hose [C] (both ends with the clamps [D]) as shown.
Right Side View [E]

○Apply soap and water solution to the areas [F] as shown.

○Watching the pressure gauge, squeeze the pump lever [G], and build up the pressure until the pressure reaches the maximum pressure.

Injector Fuel Line Maximum Pressure
Standard: 294 kPa (3.0 kgf/cm², 43 psi)

NOTICE

During pressure testing, do not exceed the maximum pressure for which the system is designed.

○Watch the gauge for at least 6 seconds.

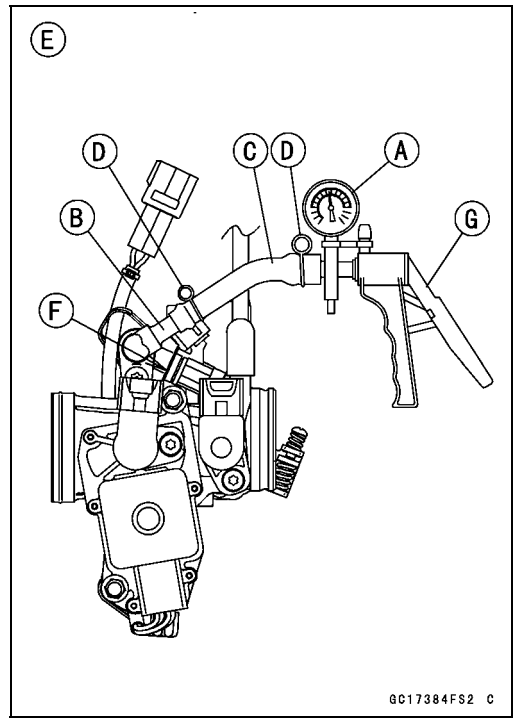
★If the pressure holds steady, the fuel line is good.

★If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe assy, injectors and related parts.

○Repeat the leak test, and check the fuel line for no leakage.

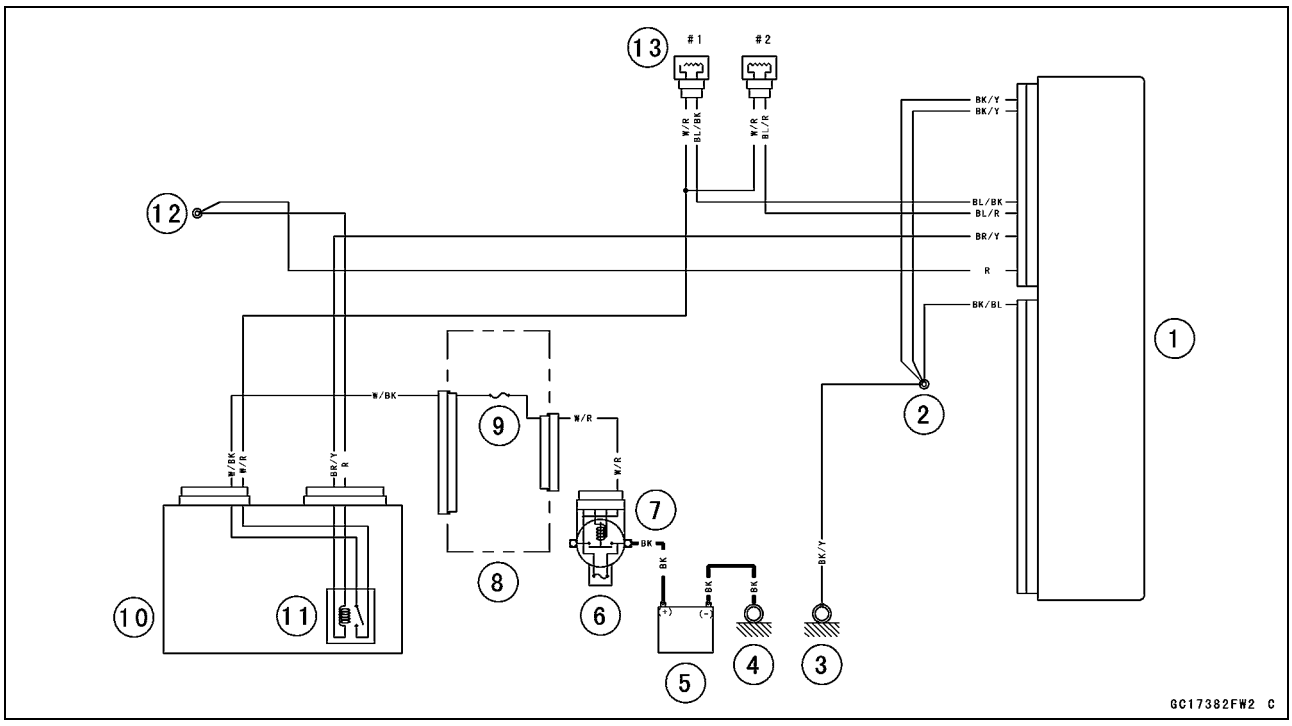
● Install:
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
Fuel Tank (see Fuel Tank Installation)

● Start the engine and check for fuel leakage.



Fuel Injectors

Fuel Injector Circuit



1. ECU
2. Water-proof Joint 2
3. Frame Ground
4. Engine Ground
5. Battery 12 V 8 Ah
6. Main Fuse 30 A
7. Starter Relay
8. Fuse Box 1
9. FI Fuse 15 A
10. Relay Box
11. Fuel Pump Relay
12. Water-proof Joint 5
13. Fuel Injectors

Throttle Grip and Cables

Free Play Inspection

- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Free Play Adjustment

- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

Cable Installation

- Install the throttle cables in accordance with the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the lower ends of the throttle cables in the throttle pulley on the throttle body assy after installing the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly (see Throttle Control System Inspection in the Periodic Maintenance chapter).

⚠ WARNING

Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition. Be sure the cables are routed correctly and properly adjusted.

Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Throttle Body Assy

Idle Speed Inspection/Adjustment

- Refer to the Idle Speed Inspection/Adjustment in the Periodic Maintenance chapter.

Synchronization Inspection/Adjustment

- Refer to the Engine Vacuum Synchronization Inspection in the Periodic Maintenance chapter.

Throttle Body Assy Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

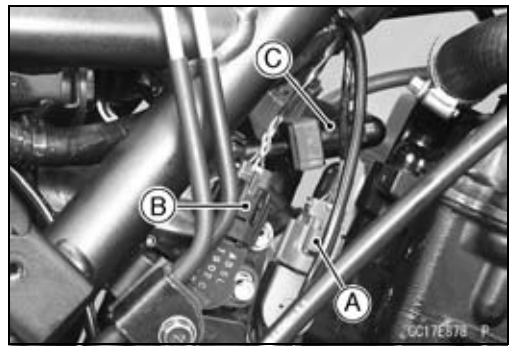
NOTICE

If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

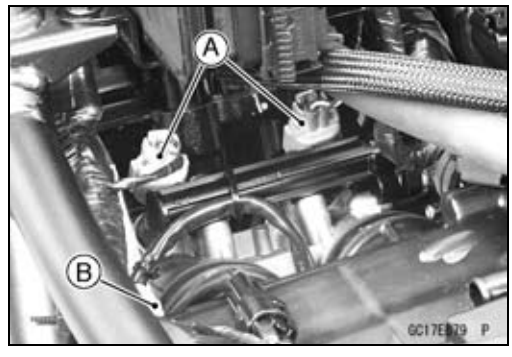
NOTICE

Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.

- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Clean around the throttle body assy thoroughly.
- Disconnect:
  Main Throttle Sensor Connector [A]
  Subthrottle Sensor Connector [B]
- Remove the fuel hose [C] (see Fuel Hose Replacement in the Periodic Maintenance chapter).

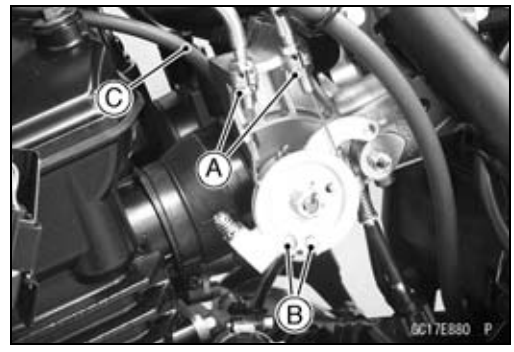


- Disconnect:
  Fuel Injector Connectors [A]
  Subthrottle Valve Actuator Connector [B]

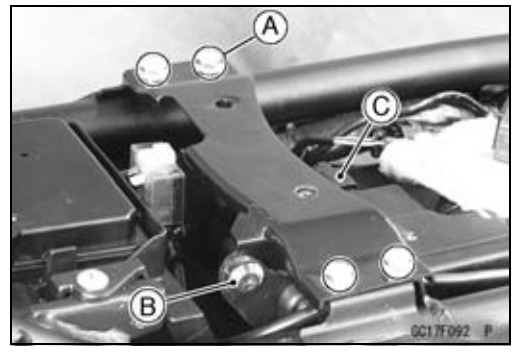


Throttle Body Assy

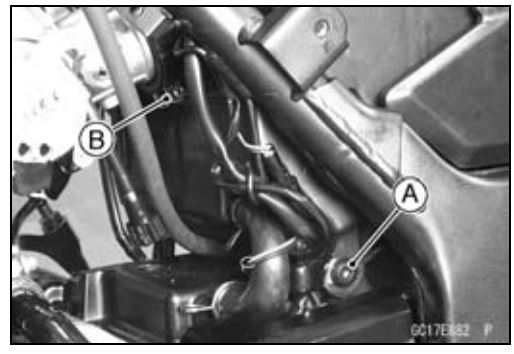
- Loosen the nuts [A], and remove the throttle cable lower ends [B].
- Disconnect the vacuum hose [C].



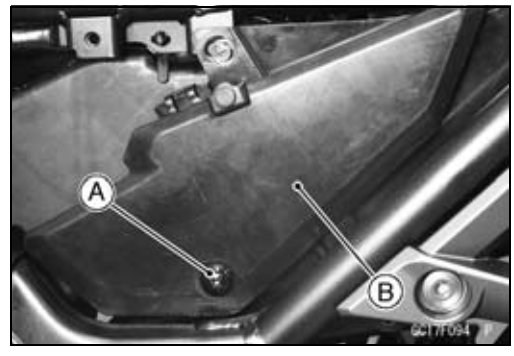
- Remove:
  Bracket Bolts [A]
  Upper Air Cleaner Housing Mounting Bolt [B]
- Disconnect the air switching valve hose and intake air temperature sensor connector [C] from the air cleaner housing.



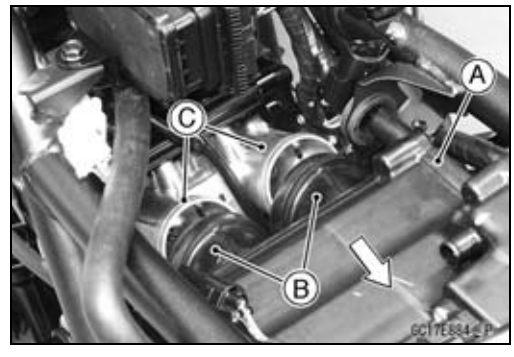
- Remove the lower air cleaner housing mounting bolt [A].
- Loosen the air duct clamp screw [B] (both sides).



- Remove:
  Battery (see Battery Removal in the Electrical System chapter)
  Air Cleaner Housing Cap (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
  Screw [A]
  Left Inner Cover [B]

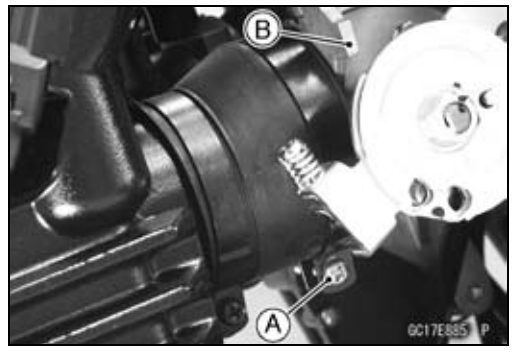


- Move the air cleaner housing [A] backward to pull out the air ducts [B] from the throttle body assy [C].



Throttle Body Assy

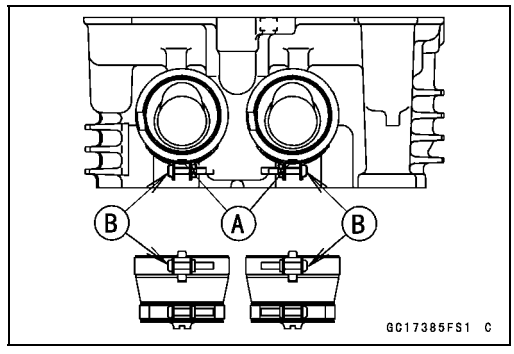
- Loosen the throttle body assy holder clamp screws [A], and pull the throttle body assy [B] backward.
- Remove the throttle body assy to left side of motorcycle.
- After removing the throttle body assy, stuff pieces of lint-free, clean cloth into the throttle body assy holders.



Throttle Body Assy Installation

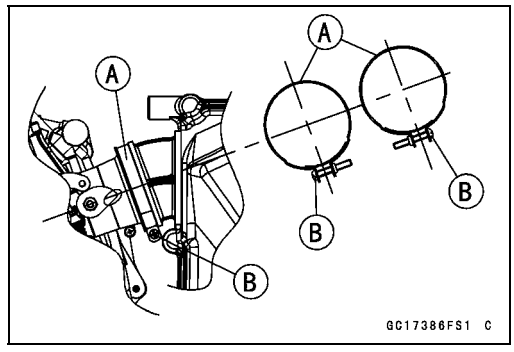
- Install the throttle body assy holder clamps [A] in the direction as shown.
  Screw Heads [B]
- Install the throttle body assy to the throttle body assy holders.
- Tighten:

Torque - Throttle Body Assy Holder Clamp Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)



- Install the air duct clamps [A] in the direction as shown.
  Screw Heads [B]
- Move the air cleaner housing forward to connect the air ducts to the throttle body assy.
- Tighten:

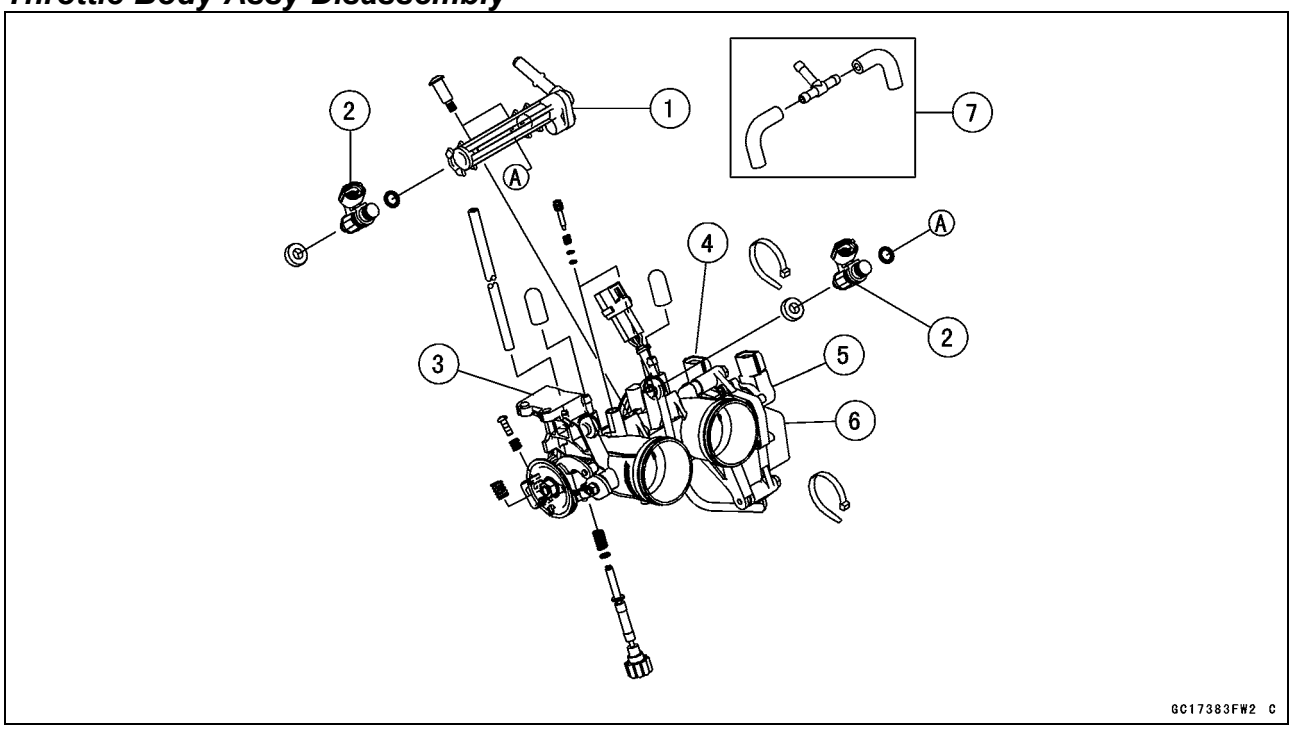
Torque - Air Duct Clamp Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)
Air Cleaner Housing Mounting Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)



- Tighten the air cleaner mounting bolts (see Air Cleaner Housing Installation).
- Apply a thin coating of grease to the throttle cable lower ends.
- Fit the accelerator cable end and the decelerator cable end into the throttle pulley.
- Turn the throttle grip and make sure that the throttle valves move smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust:
  Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)

Throttle Body Assy

Throttle Body Assy Disassembly



1. Delivery Pipe Assy
2. Fuel Injectors
3. Throttle Body Assy
4. Main Throttle Sensor
5. Subthrottle Sensor
6. Subthrottle Valve Actuator
7. For CAL Model

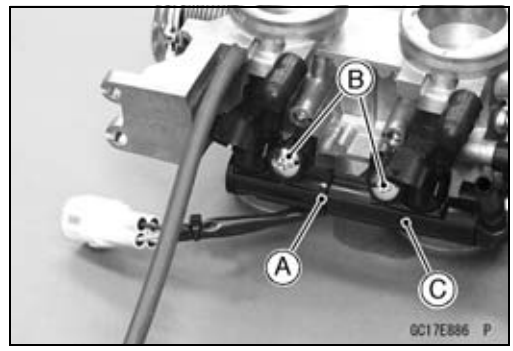
NOTICE

Do not remove, disassemble or adjust the main throttle sensor, subthrottle sensor, subthrottle valve actuator, throttle link mechanism and throttle body assy, because they are adjust or set surely at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of the throttle body assy.

- Remove the throttle body assy (see Throttle Body Assy Removal).
- Cut the band [A].
- Remove the screws [B] and pull out the injectors from the throttle body assy together with the delivery pipe assy [C].

NOTE

○*Do not damage the insertion portions of the injectors when they are pulled out from the throttle body.*



Throttle Body Assy

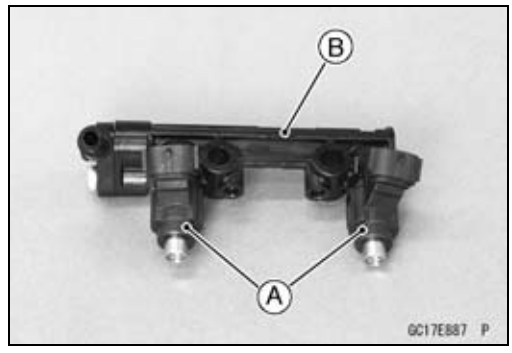
- Pull out the injectors [A] from the delivery pipe assy [B].

NOTE

○*Do not damage the insertion portions of the injectors when they are pulled out from the delivery pipe assy.*

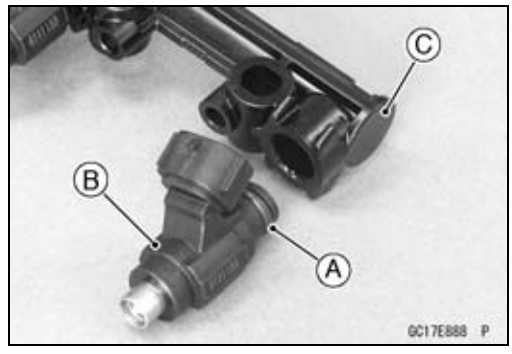
NOTICE

Never drop the fuel injector especially on a hard surface. Such a shock to the injector can damage it.



Throttle Body Assy Assembly

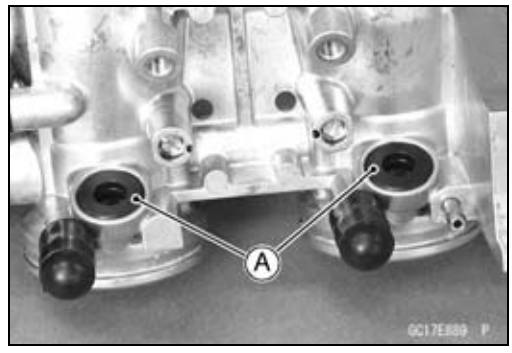
- Before assembling, blow away dirt or dust from the throttle body and delivery pipe by applying compressed air.
- Replace the O-rings [A] of each injector [B] with new ones.
- Apply engine oil to the new O-rings, insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.



- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the injectors along with the delivery pipe assy to the throttle body.
- Tighten:

Torque - Delivery Pipe Assy Mounting Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)

- Bind the lead with band.
- Install the throttle body assy (see Throttle Body Assy Installation).



Air Cleaner

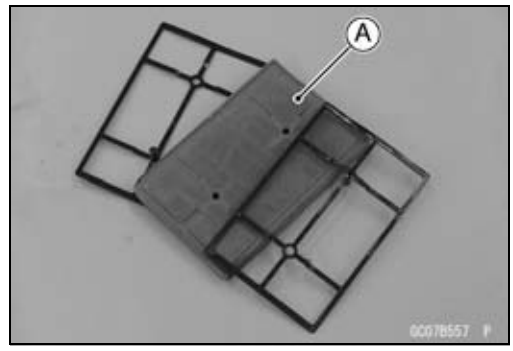
Air Cleaner Element Removal/Installation

- Refer to the Air Cleaner Element Replacement in the Periodic Maintenance chapter.

Air Cleaner Element Inspection

- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.

★If the element has any tears or breaks, replace the element.



Air Cleaner Oil Draining

- Visually check the drain cap [A] if the water or oil accumulates.

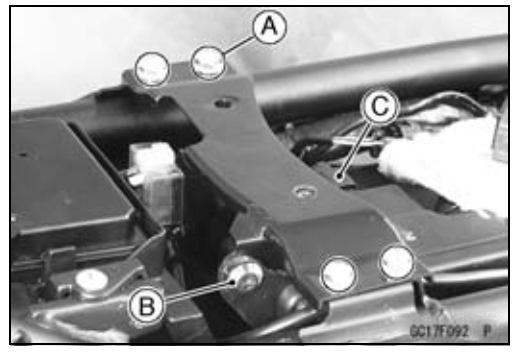
★If any water or oil accumulates in the cap, remove the cap and drain it.

⚠ WARNING

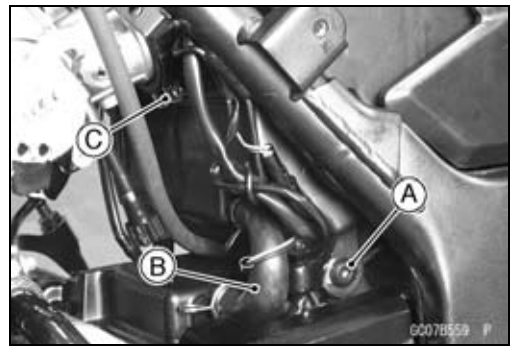
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the cap in the drain hose after draining.

Air Cleaner Housing Removal

- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal)
  Bracket Bolts [A]
  Upper Air Cleaner Housing Mounting Bolt [B]
  Chain Cover (see Driver Chain Removal in the Final Drive chapter)
  Rear Fender (see Flap and Rear Fender Removal in the Frame chapter)
- Disconnect the air switching valve hose and intake air temperature sensor connector [C] from the air cleaner housing.

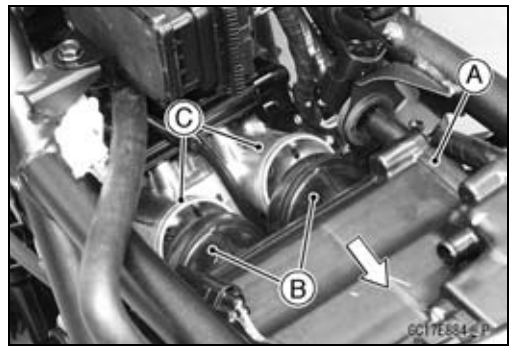


- Clean around the throttle body assy thoroughly.
- Remove:
  Lower Air Cleaner Housing Mounting Bolt [A]
- Disconnect the breather hose [B] from the air cleaner housing.
- Loosen the air duct clamp screw [C] (both sides).

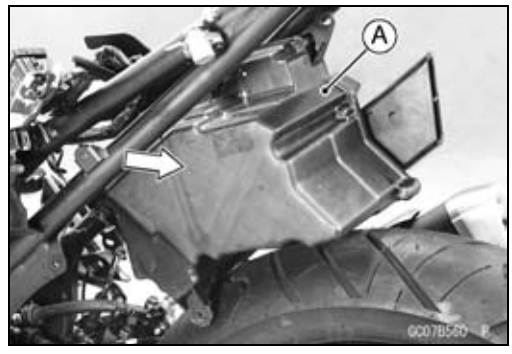


Air Cleaner

- Move the air cleaner housing [A] backward to pull out the air ducts [B] from the throttle body assy [C].



- Remove the air cleaner housing [A] from the frame as shown.
- After removing the air cleaner housing, stuff pieces of lint-free, clean cloth into the throttle body assy.

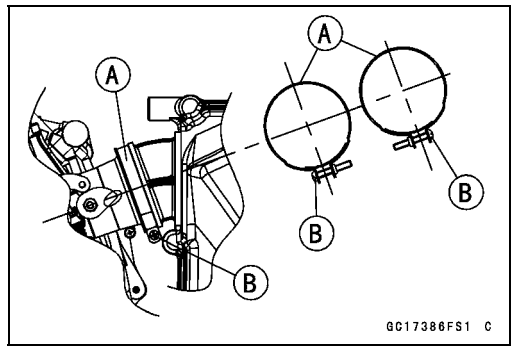


NOTICE

If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

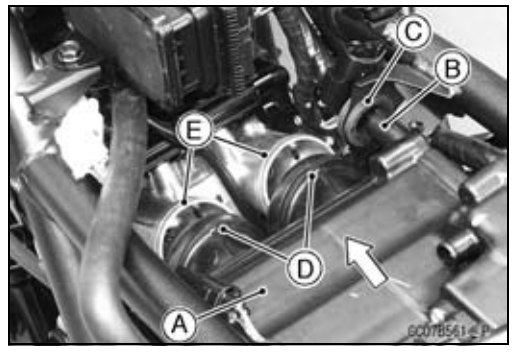
Air Cleaner Housing Installation

- Installation is the reverse of removal.
- ○Install the air duct clamps [A] in the direction as shown.
  Screw Heads [B]



- Push the air cleaner housing [A] forward to insert the projection [B] into the grommet [C].
- Insert the air ducts [D] to the throttle body [E].
- Tighten:

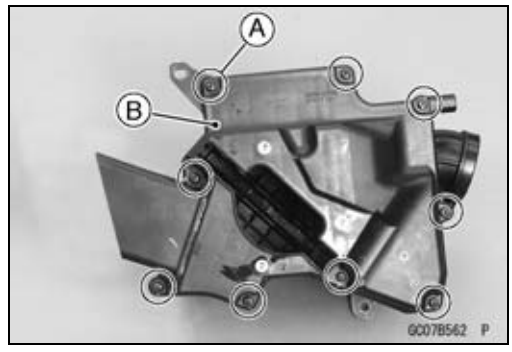
Torque - Air Duct Clamp Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)
Air Cleaner Housing Mounting Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)



- Install the removed parts (see appropriate chapters).

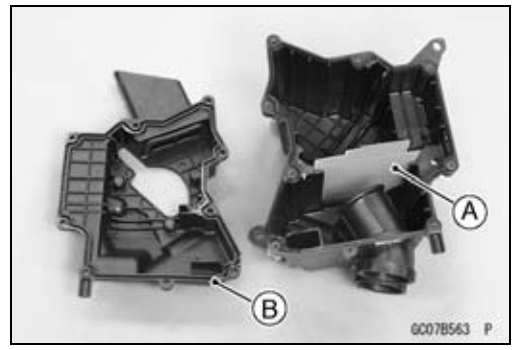
Air Cleaner Housing Disassembly

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal)
  Air Cleaner Element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
  Screws [A]
  Right Cover [B]
  Flame Arrester

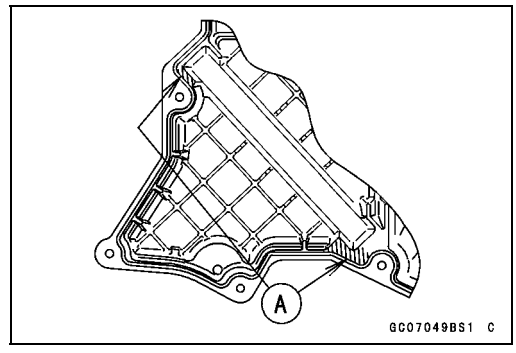


Air Cleaner

Air Cleaner Housing Assembly



- Install the flame arrester [A].
- Be sure the seal ring [B] is in position.



- Apply a adhesive cement to the slash portions [A] of the air cleaner housing.
- Install the right cover.
- Tighten:

Torque - Air Cleaner Housing Screws: 1.15 N·m (0.117 kgf·m, 10 in·lb)

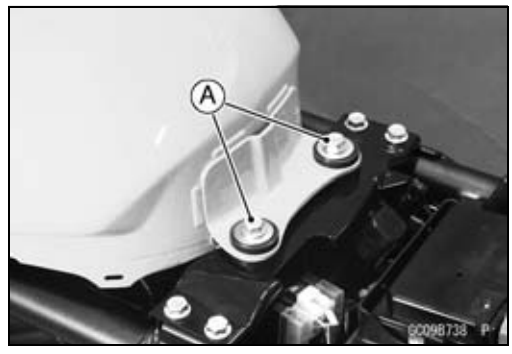
Fuel Tank

Fuel Tank Removal

⚠ WARNING

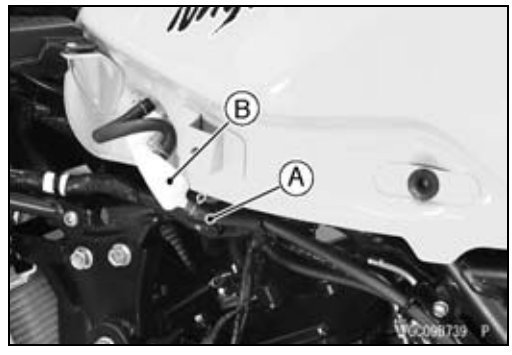
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Turn the ignition switch off.
- Wait until the engine cools down.
- Disconnect the battery (–) terminal (see Battery Removal in the Electrical System chapter).
- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  Tank Side Cover (see Tank Side Cover Removal in the Frame chapter)
  Fuel Tank Bolts [A]

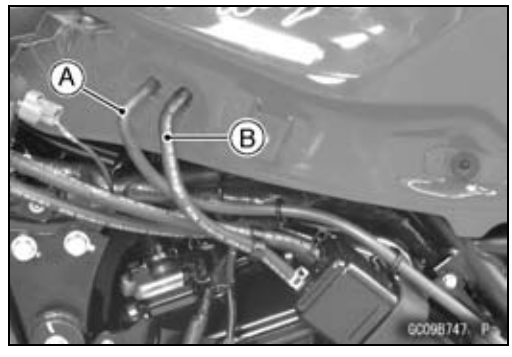


- Disconnect the fuel tank drain hose [A] from the tank [B].

○In this photo, the left middle fairing has been removed for clearity.

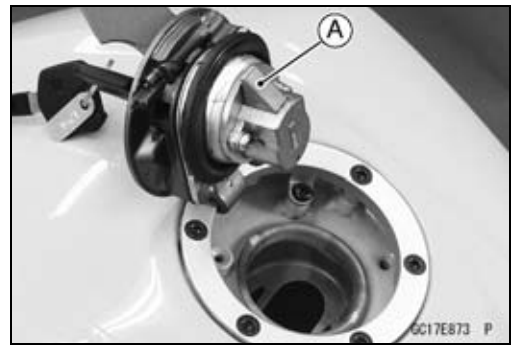


- For models equipped with the evapratice emission control system, disconnect the fuel tank drain hose [A] and breather hose [B] from the fuel tank.



Fuel Tank

- Open the fuel tank cap [A] to release the pressure in the tank.

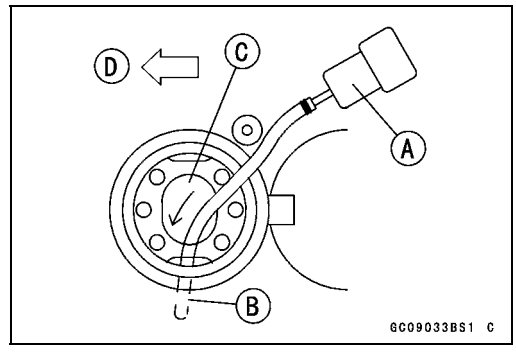


- Draw the fuel out from the fuel tank with a commercially available pump [A].

○Use a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.

○Put the hose through the fill opening [C] into the tank and draw the fuel out.

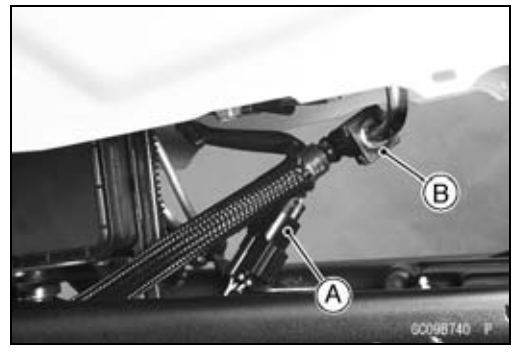
Front [D]



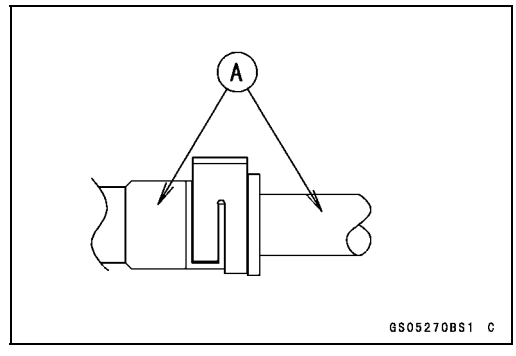
⚠ WARNING

Spilled fuel is flammable and can be explosive under certain conditions. The fuel can not be removed completely from the fuel tank. Be careful for remained fuel spillage.

- Lift the rear of the fuel tank slightly and disconnect the fuel pump lead connector [A].
- Be sure to place a piece of cloth around the fuel hose joint [B].



- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.



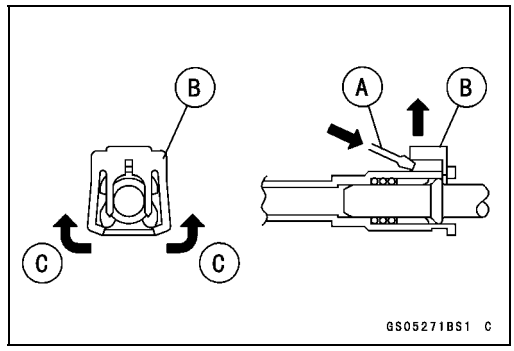
Fuel Tank

When removing with standard tip screwdriver

- Insert the standard tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

When removing with fingers

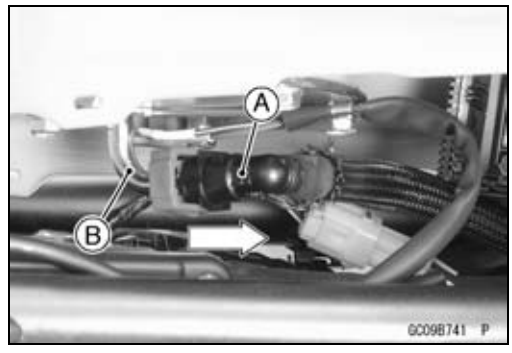
- Open and push up [C] the joint lock with your fingers.



NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.

- Pull the fuel hose joint [A] out of the outlet pipe [B].

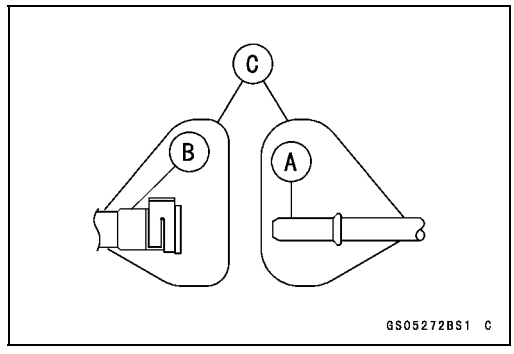


⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Remove the fuel tank, and place a it on a flat surface.

- Clean the pipe [A].
- Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.
- Close the fuel tank cap.

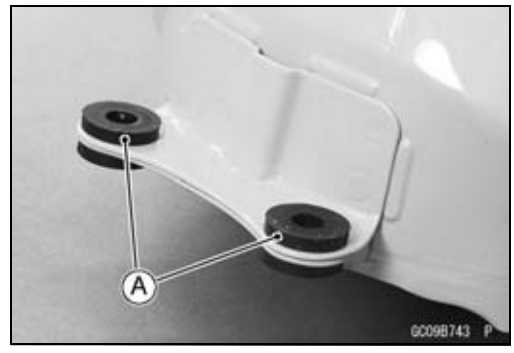


Fuel Tank

Fuel Tank Installation

- Note the above WARNING (see Fuel Tank Removal).
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Check that the dampers [A] are in place on the frame and the fuel tank.

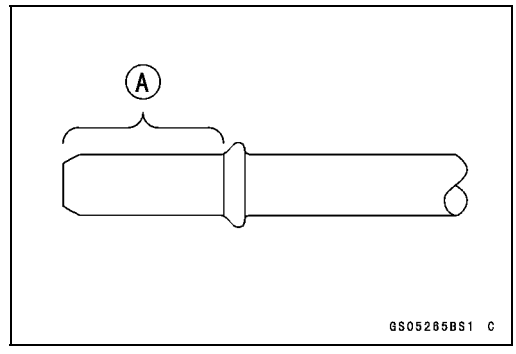
★If the dampers are damaged or deteriorated, replace them.



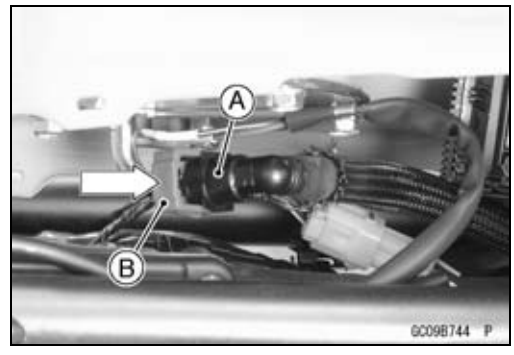
- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.

★If the joint lock is deformed, replace the fuel hose with a new one.

- Check that there are no flaws, burrs, and adhesion of foreign materials on the outlet pipe [A].
- Apply engine oil to the pipe.



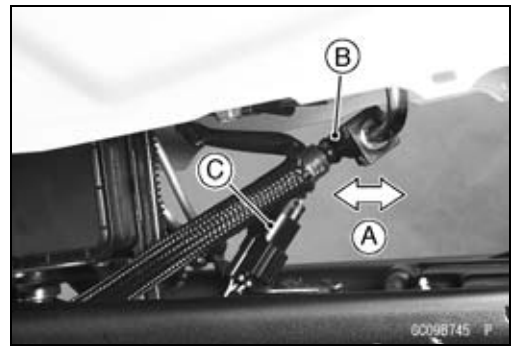
- Insert the fuel hose joint [A] straight onto the outlet pipe until the hose joint clicks.
- Push the joint lock [B] until the hose joint clicks.



- Push and pull [A] the hose joint [B] more than two times to make sure it is locked and does not come off.

⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.



★If it comes off, reinstall the hose joint.

- Connect the fuel pump lead connector [C] and the battery (–) terminal (see Battery Installation in the Electrical System chapter).
- Install the removed parts (see appropriate chapters).

Fuel Tank

Fuel Tank Inspection

- Open the tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the gasket if it is damaged.

- Check to see if the water drain hole [B] in the tank is not clogged. Check the tank cap breather also.

★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

NOTICE

Do not apply compressed air to the air vent holes [C] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.

Fuel Tank Cleaning

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Fuel Pump (see Fuel Pump Removal)
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:
  Fuel Pump (see Fuel Pump Installation)
  Fuel Tank (see Fuel Tank Installation)

Evaporative Emission Control System (CAL Model)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister [A] when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

Parts Removal/Installation

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch off. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

NOTICE

If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.

- Connect the hoses according to the diagram of the system (see Cable, Wire, and Hose Routing section in the Appendix chapter). Make sure they do not get pinched or kinked.

Hose Inspection

- Refer to the Evaporative Emission Control System Inspection (CAL Model) in the Periodic Maintenance chapter.

Purge Valve Inspection

- Refer to the Purge Valve Inspection.

Canister Inspection

- Refer to the Evaporative Emission Control System Inspection (CAL Model) in the Periodic Maintenance chapter.

Cooling System

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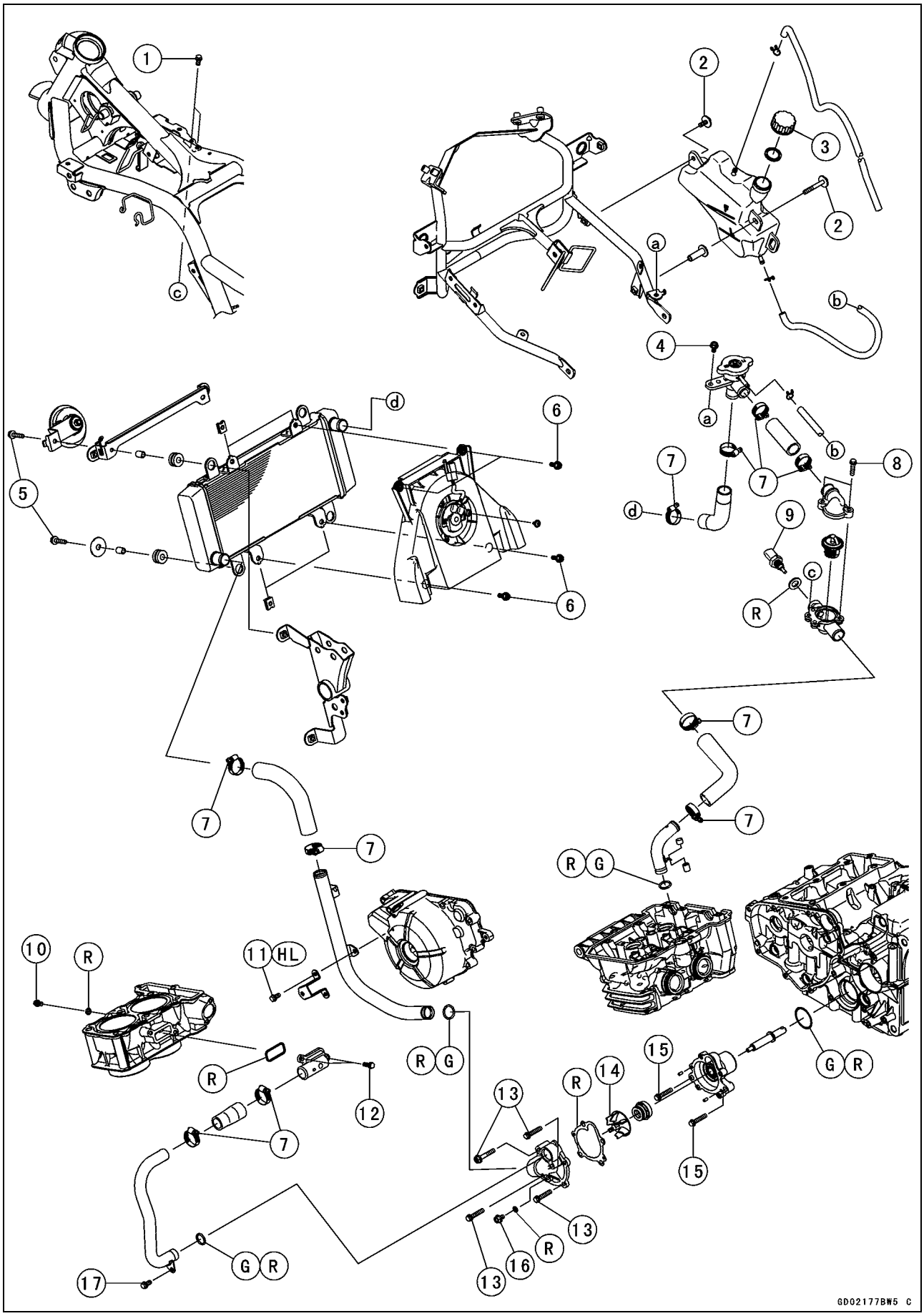
Exploded View

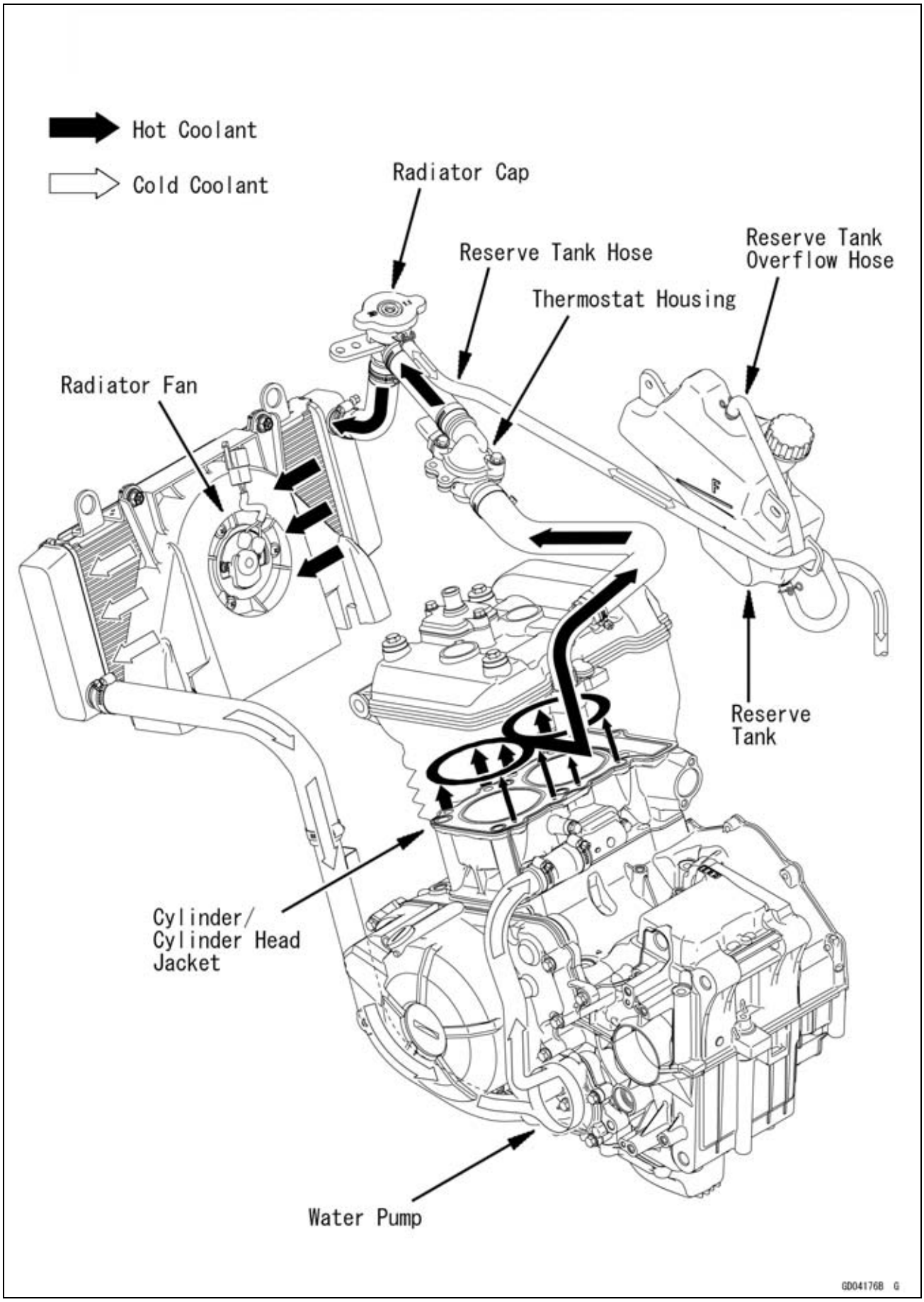


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
2	Reserve Tank Bolts	4.0	0.41	35 in·lb	
3	Reserve Tank Cap	–	–	–	Hand-Tighten
4	Radiator Cap Bracket Bolt	9.8	1.0	87 in·lb	
5	Radiator Bolts	9.8	1.0	87 in·lb	
6	Radiator Fan Assy Mounting Bolts	8.4	0.86	74 in·lb	
7	Water Hose Clamp Screws	3.0	0.31	27 in·lb	
8	Thermostat Cover Bolts	9.8	1.0	87 in·lb	
9	Water Temperature Sensor	12	1.2	106 in·lb	
10	Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
11	Left Middle Fairing Bracket Bolts	9.8	1.0	87 in·lb	HL
12	Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
13	Water Pump Cover Bolts	9.8	1.0	87 in·lb	
14	Water Pump Impeller	9.8	1.0	87 in·lb	
15	Water Pump Bolts	9.8	1.0	87 in·lb	
16	Coolant Drain Bolt (Water Pump)	9.8	1.0	87 in·lb	
17	Water Pipe Bolt	9.8	1.0	87 in·lb	

G: Apply grease.
HL: Apply a non-permanent locking agent (High Strength).
R: Replacement Parts

Coolant Flow Chart



Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 63.5 ~ 66.5°C (146 ~ 152°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 63.5 ~ 66.5°C (146 ~ 152°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 103°C (217°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 98°C (208°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

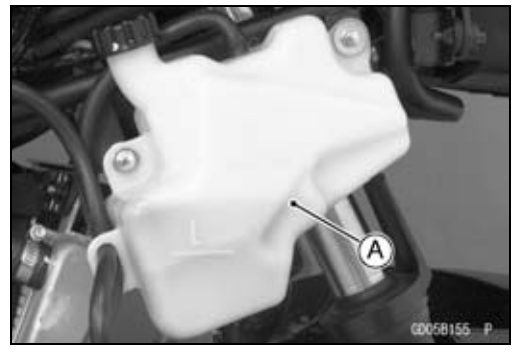
4-6 COOLING SYSTEM

Specifications

Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	−35°C (−31°F)
Total Amount	1.5 L (1.6 US qt) (reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)
Thermostat	
Valve Opening Temperature	63.5 ~ 66.5°C (146 ~ 152°F)
Valve Full Opening Lift	6 mm (0.24 in.) or more at 80°C (176°F)

Coolant

Coolant Deterioration Inspection



- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Visually inspect the coolant [A] in the reserve tank.

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Coolant Level Inspection

- Refer to the Coolant Level Inspection in the Periodic Maintenance chapter.

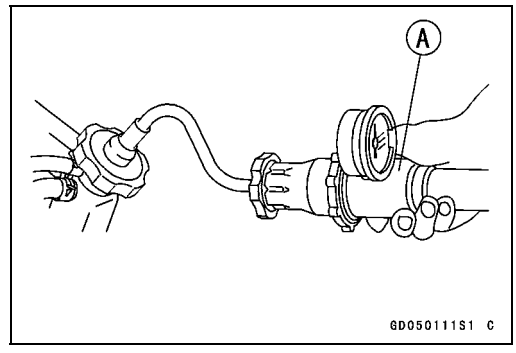
Coolant Draining

- Refer to the Coolant Change in the Periodic Maintenance chapter.

Coolant Filling

- Refer to the Coolant Change in the Periodic Maintenance chapter.

Pressure Testing



- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the filler neck.

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kgf/cm², 18 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 18 psi).

- Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is all right.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

Coolant

Cooling System Flushing

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerable reduce the efficiency of the cooling system.

- Drain the cooling system (see Coolant Change in the Periodic Maintenance chapter).
- Fill the cooling system with fresh water mixed with a flushing compound.

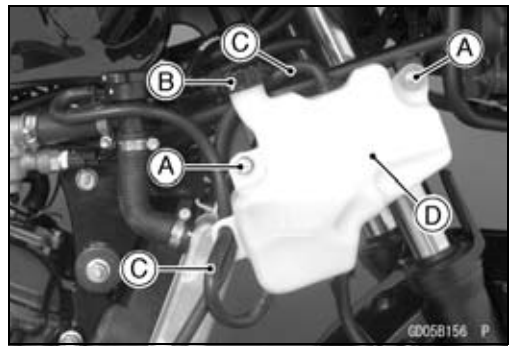
NOTICE

Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Change in the Periodic Maintenance chapter).

Coolant Reserve Tank Removal

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Bolts [A]
  Cap [B]
- Pour the coolant into a container.
- Remove:
  Hoses [C]
  Coolant Reserve Tank [D]



Coolant Reserve Tank Installation

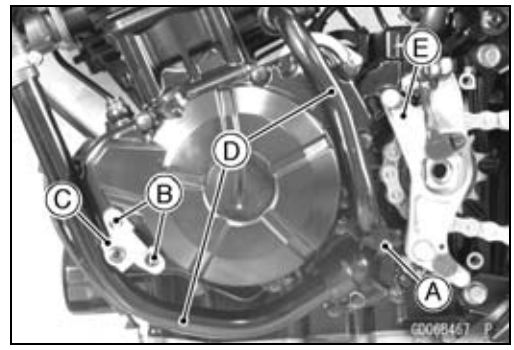
- Installation is the reverse of removal.
- Run the cable and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Torque - Reserve Tank Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)

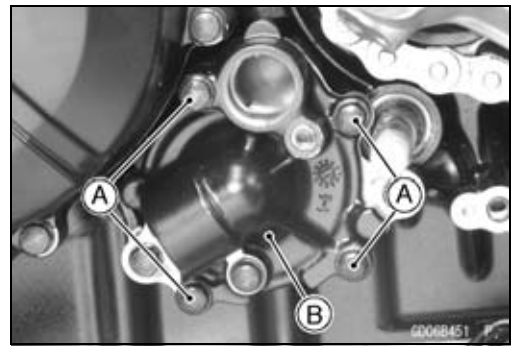
Water Pump

Water Pump Cover Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Water Pipe Bolt [A]
  Left Middle Fairing Bracket Bolt [B]
  Bracket [C]
  Water Pipes [D]
  Speed Sensor Bracket [E] (see Engine Sprocket Removal in the Final Drive chapter)



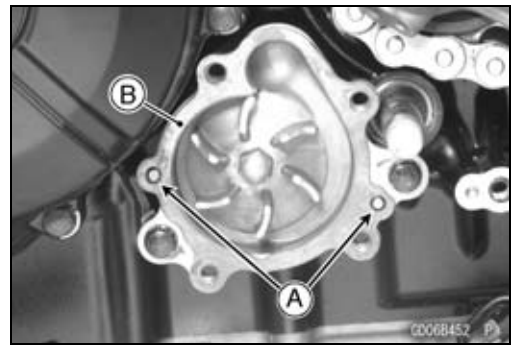
- Remove:
  Water Pump Cover Bolts [A]
  Water Pump Cover [B]



Water Pump Cover Installation

- Be sure that the dowel pins [A] is in position.
- Replace the water pump cover gasket [B] with a new one.
- Install the water pump cover and water pipes, and tighten the bolts.

Torque - Water Pump Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Water Pipe Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



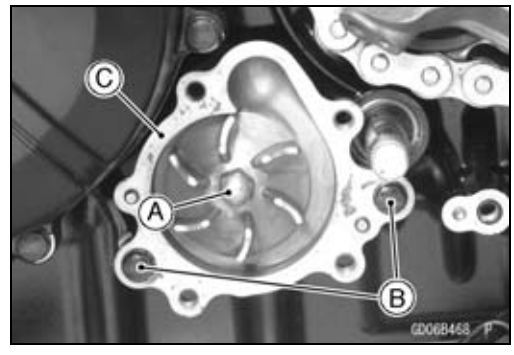
- Apply a non-permanent locking agent (High Strength) to the threads of the left middle fairing bracket bolt.
- Install the bracket, and tighten the bolt.

Torque - Left Middle Fairing Bracket Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

Water Pump Removal

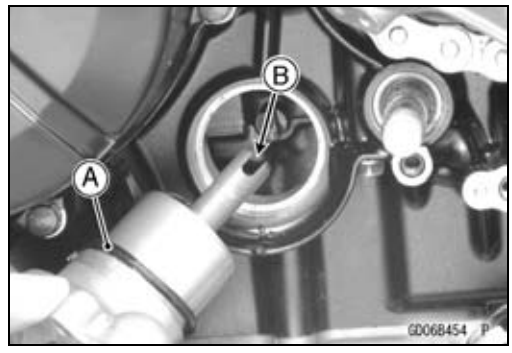
- Shift the transmission into 1st gear.
- Remove the water pump cover (see Water Pump Cover Removal).
- While applying the rear brake, remove the water pump impeller [A].
- Remove:
  Water Pump Bolts [B]
  Water Pump Housing [C]



Water Pump

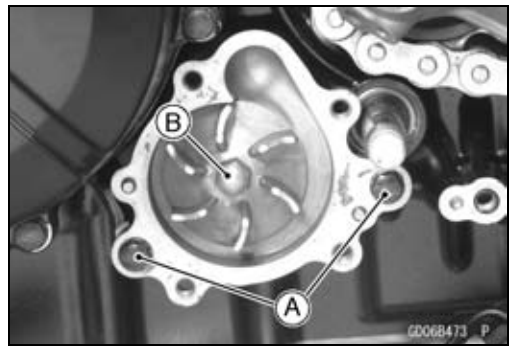
Water Pump Installation

- Apply grease to a new O-ring [A].
- Install the water pump aligning the slot [B] of the water pump shaft with the oil pump shaft.



- Tighten:

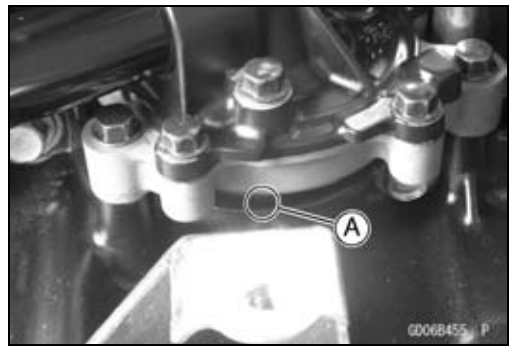
Torque - Water Pump Bolts [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Water Pump Impeller [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Water Pump Inspection

- Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leaks.

★If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the mechanical seal with a new one.

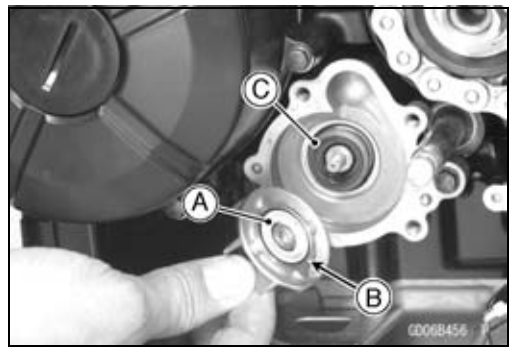


Mechanical Seal Inspection

- Remove the impeller (see Water Pump Removal).
- Visually inspect the mechanical seal.

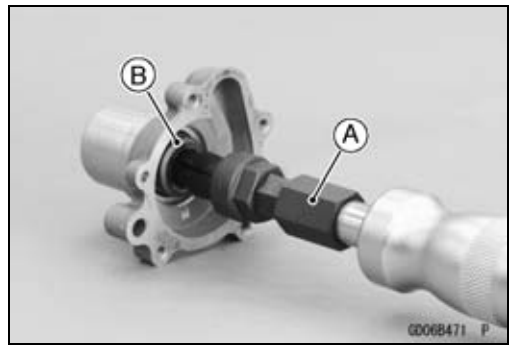
★If any of the parts is damaged, replace the mechanical seal with a new one (see Mechanical Seal Removal/Installation).

○The sealing seat and rubber seal may be removed easily by hand.
Impeller Sealing Seat Surface [A]
Rubber Seal [B]
Mechanical Seal Diaphragm [C]



Mechanical Seal Removal

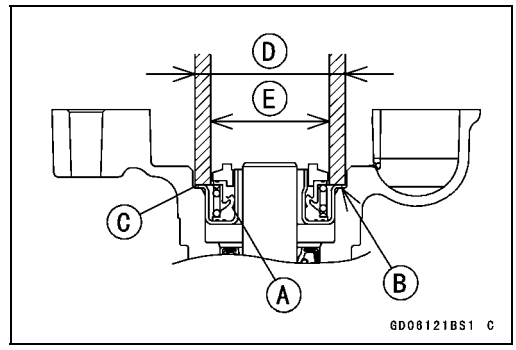
- Remove:
Water Pump (see Water Pump Removal)
Water Pump Shaft
- Using a suitable tool [A], remove the mechanical seal [B] from the water pump housing.



Water Pump

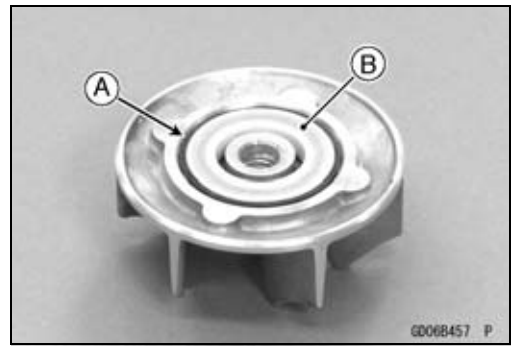
Mechanical Seal Installation

- Using a suitable tool or pipe with the dimension as shown, install the mechanical seal [A] to the water pump housing [B] until the flange [C] on the mechanical seal bottomed to the water pump housing.
  30 ~ 33 mm (1.2 ~ 1.3 in.) [D]
  26 ~ 29 mm (1.0 ~ 1.1 in.) [E]



Impeller Assembly

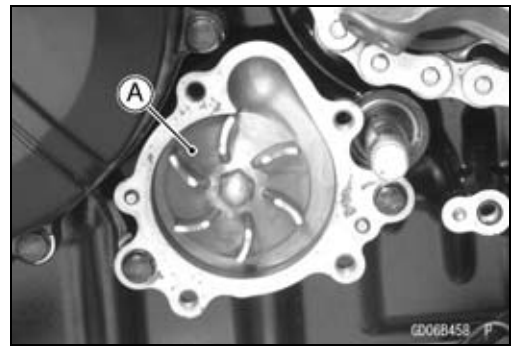
- Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal [A] and sealing seat [B], and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



Water Pump Impeller Inspection

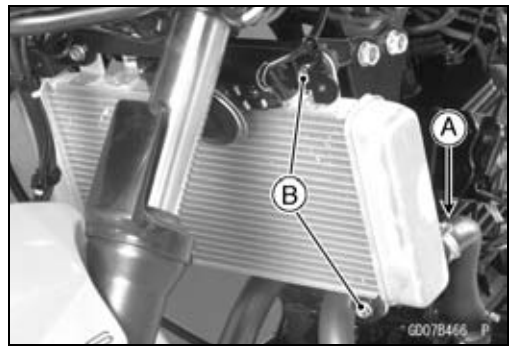
- Remove the water pump cover (see Water Pump Removal).
- Visually inspect the impeller [A].

★If the surface is corroded, or if the blades are damaged, replace the impeller with a new one (see Water Pump Removal/Installation).

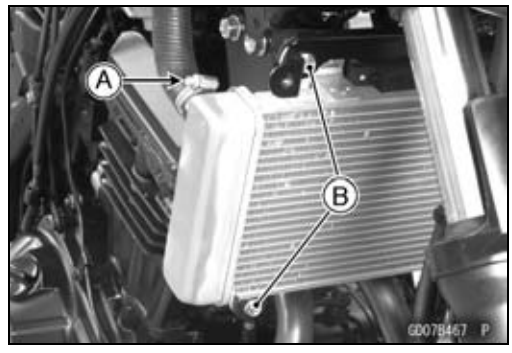


Radiator

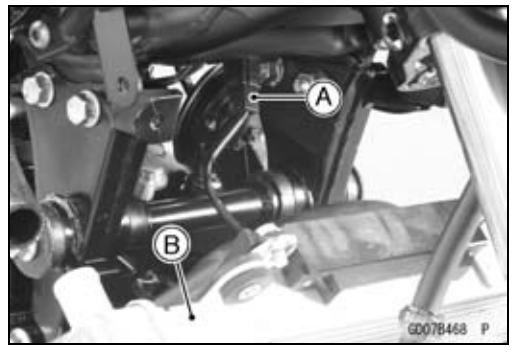
Radiator and Radiator Fan Removal



- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Inner Fairing (see Inner Fairing Removal in the Frame chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal)
  Radiator Hose Clamp Screw [A] (Loosen)
  Radiator Bolts [B]
  Horn



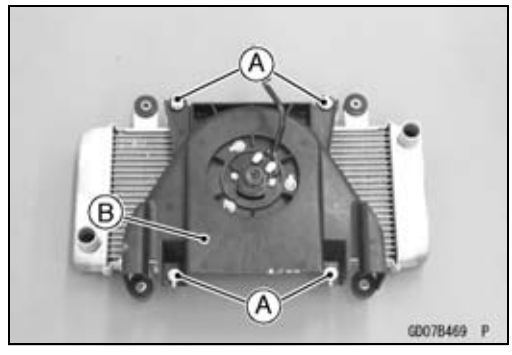
- Remove:
  Radiator Hose Clamp Screw [A] (Loosen)
  Radiator Bolts [B]



- Disconnect the radiator fan motor lead connector [A].
- Remove the radiator [B].

NOTICE

Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.



- Remove:
  Radiator Fan Assy Mounting Bolts [A]
  Radiator Fan Assy [B]

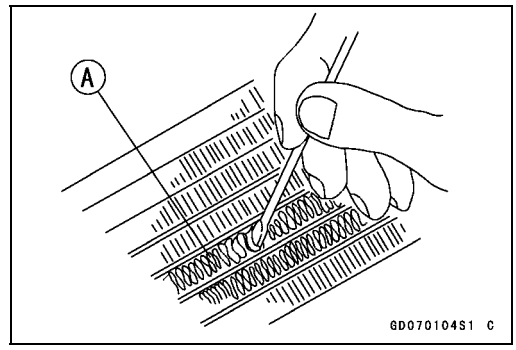
Radiator and Radiator Fan Installation

- Installation is the reverse of removal.
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Torque - Radiator Fan Assy Mounting Bolts: 8.4 N·m (0.86 kgf·m, 74 in·lb)
Radiator Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

Radiator

Radiator Inspection



- Check the radiator core.

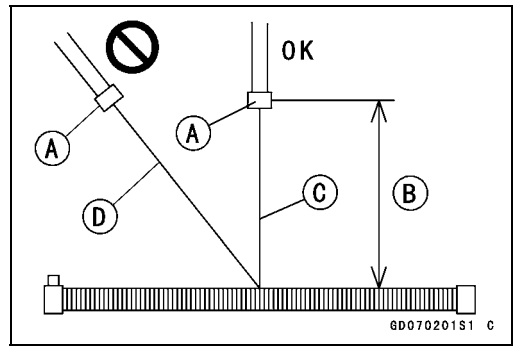
★If there are obstructions to air flow, remove them.

★If the corrugated fins [A] are deformed, carefully straighten them.

★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

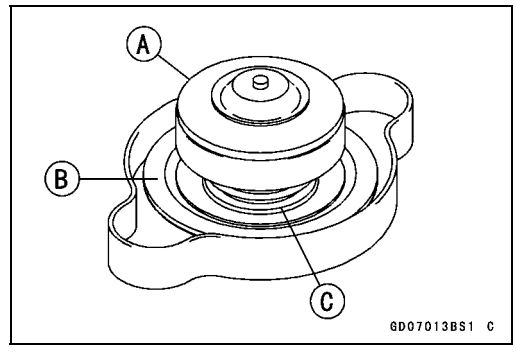
NOTICE

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:
Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun, following the core fin direction.



Radiator Cap Inspection

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Radiator Cap



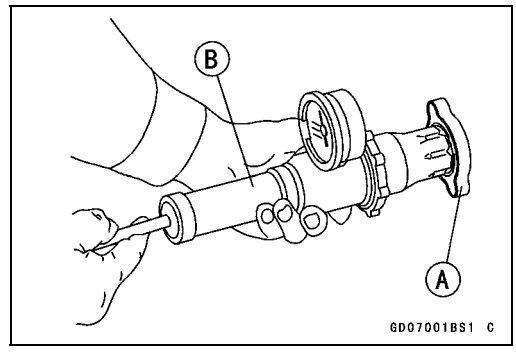
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].

★If any one of them shows visible damage, replace the cap with a new one.

- Install the cap [A] on a cooling system pressure tester [B].

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*



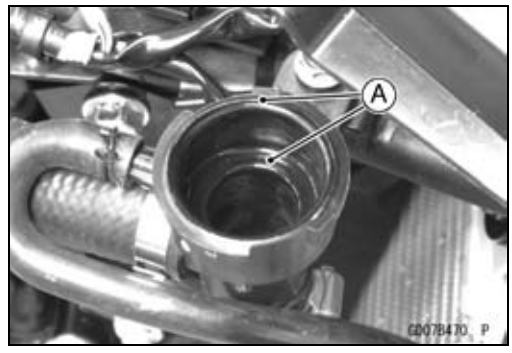
- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.

Radiator Cap Relief Pressure
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)

★If the cap can not hold the specified pressure or if it holds too much pressure, replace it with a new one.

Radiator

Radiator Filler Neck Inspection

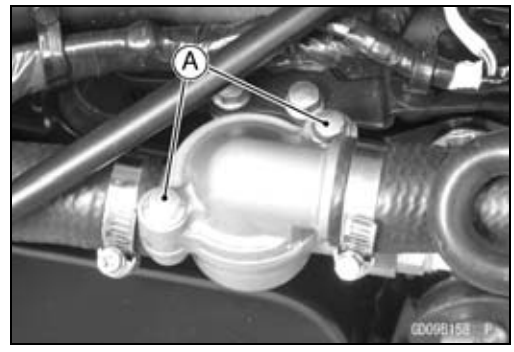


- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.

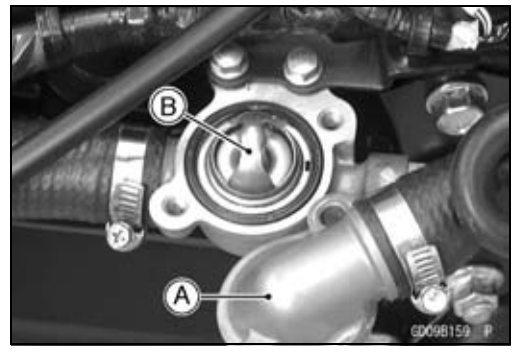
Thermostat

Thermostat Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Thermostat Cover Bolts [A]



- Move the thermostat cover [A] outwards and remove the thermostat [B].

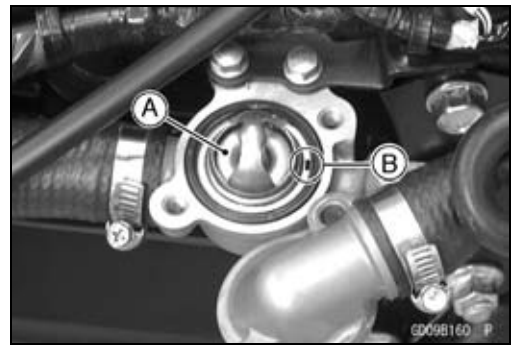


Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] faces as shown.
- Tighten:

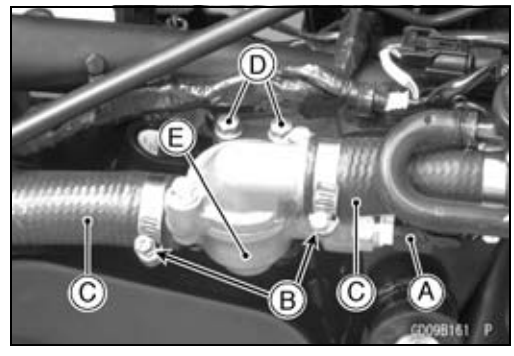
Torque - Thermostat Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



Thermostat Housing Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the water temperature sensor connector [A].
- Loosen the hose clamp screws [B].
- Disconnect the hoses [C].
- Remove:
  Thermostat Housing Mounting Bolts [D]
  Thermostat Housing [E]



Thermostat Housing Installation

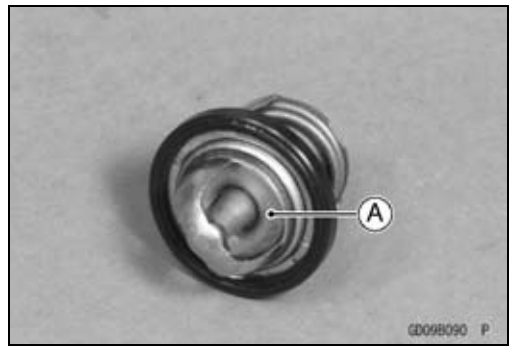
- Tighten:

Torque - Thermostat Housing Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).

Thermostat

Thermostat Inspection



- Remove the thermostat (see Thermostat Removal), and inspect the thermostat valve [A] at room temperature.

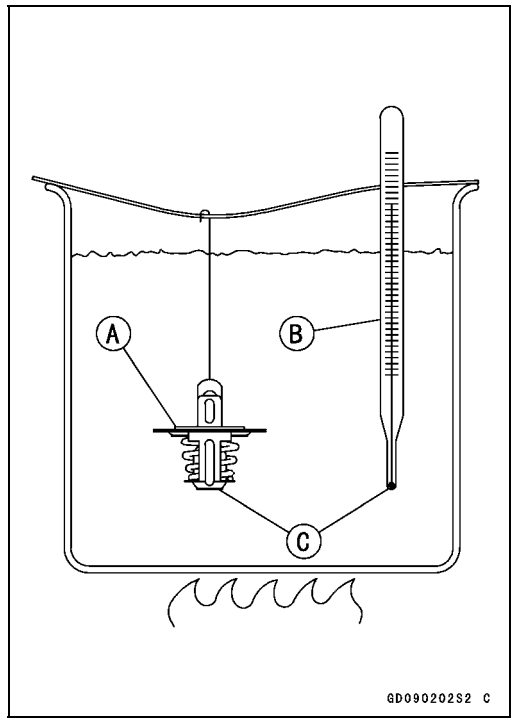
★If the valve is open, replace the thermostat with a new one.

- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

○The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.

★If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
63.5 ~ 66.5°C (146 ~ 152°F)



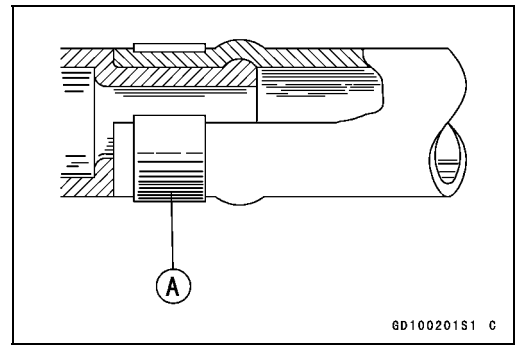
Hoses and Pipes

Hose Installation

- Install the hoses and pipes, being careful to follow bending direction. Avoid sharp bending, kinking, flattening or twisting.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the clamp [A] as near as possible to the hose end to clear the raised rib of the fitting. This will prevent the hoses from working loose.

○The clamp screws should be positioned correctly to prevent the clamps from contacting the other parts.

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)



Hose Inspection

- Refer to the Water Hose and Pipe Inspection in the Periodic Maintenance chapter.

Water Temperature Sensor

NOTICE

The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to the water temperature sensor can damage it.

Water Temperature Sensor Removal/Installation

- Refer to the Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter.

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

Engine Top End

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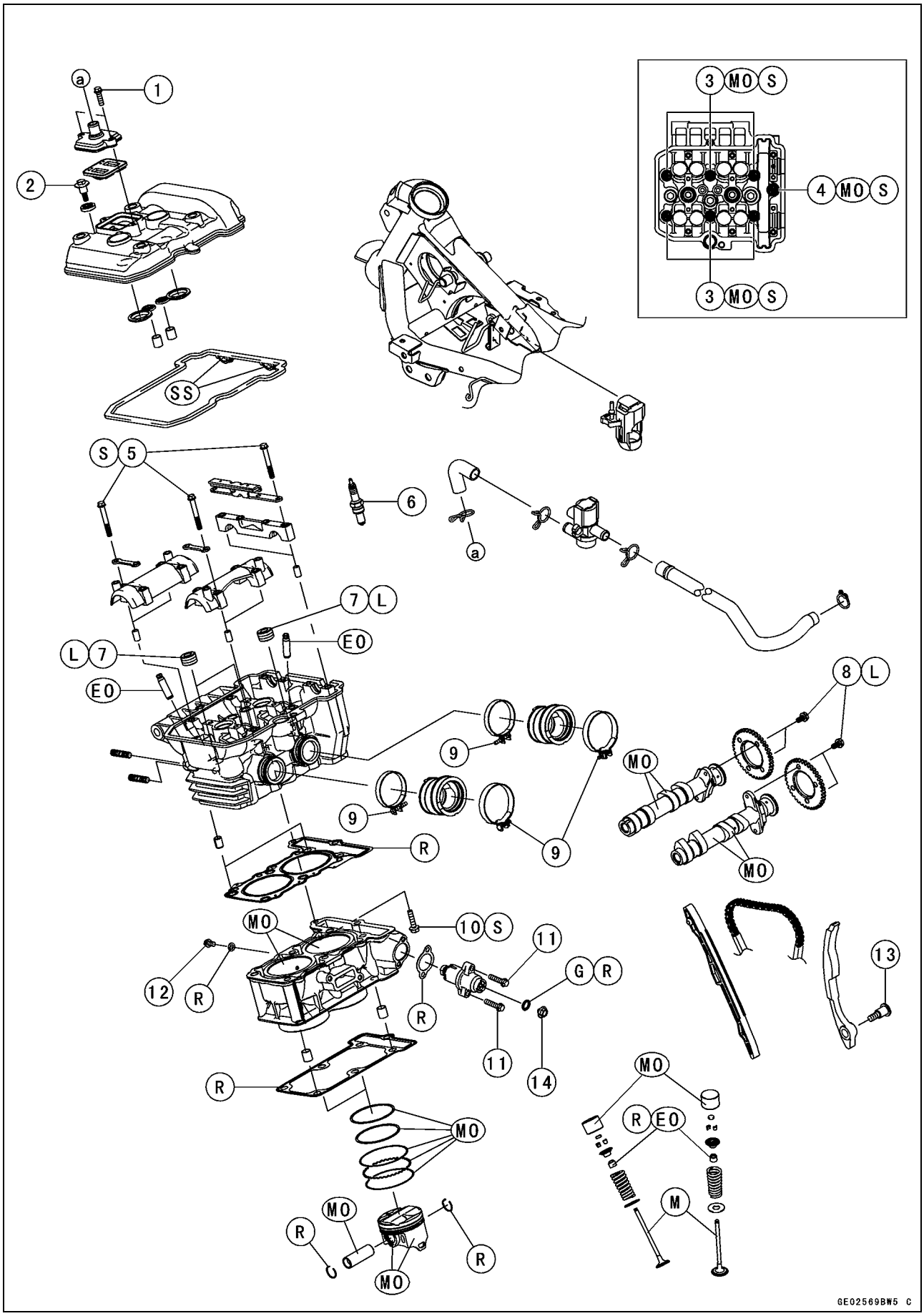
Exploded View

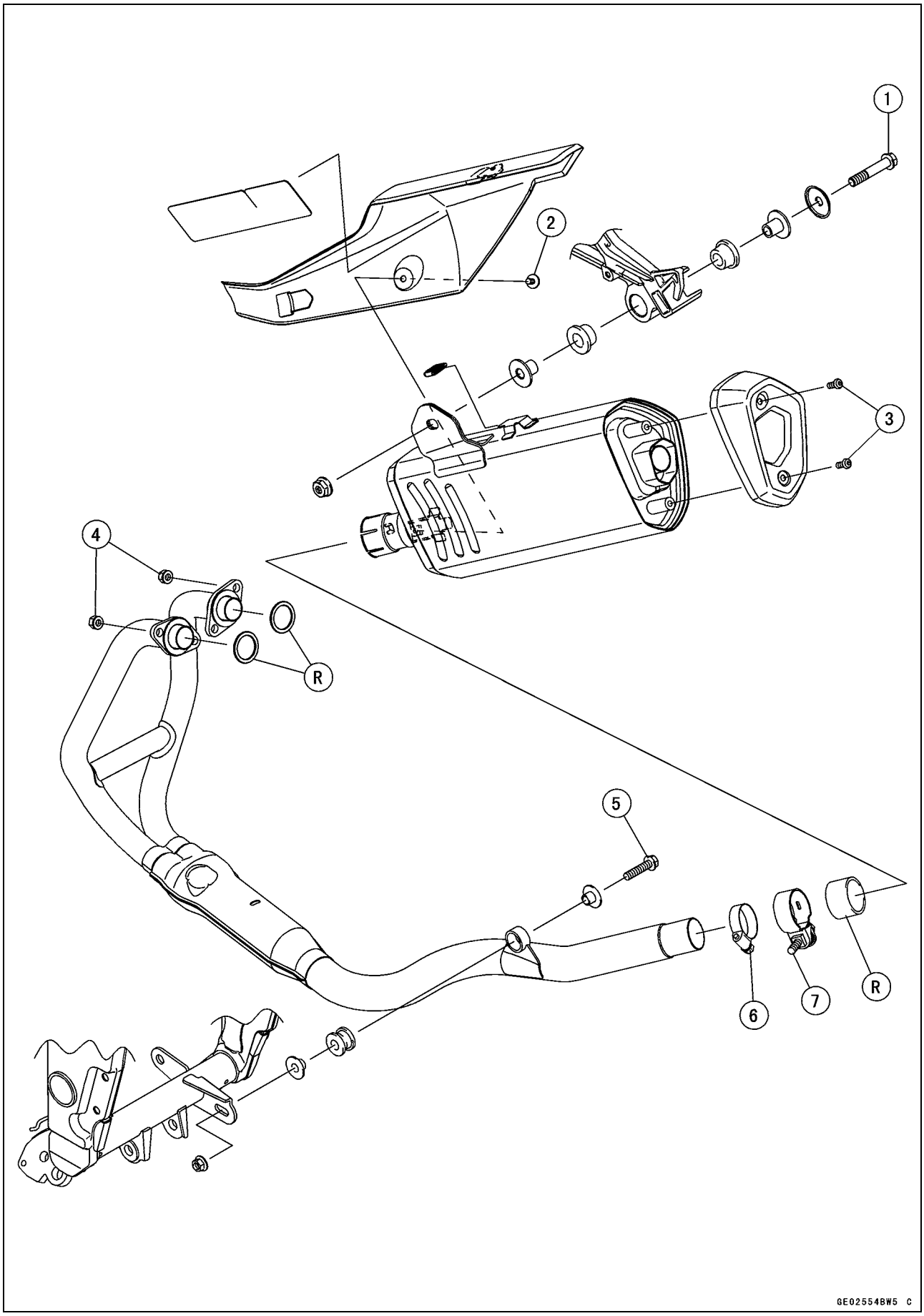


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
2	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
3	Cylinder Head Bolts (M8, L = 146)	32	3.3	24	MO, S
4	Cylinder Head Bolts (M8, L = 115)	32	3.3	24	MO, S
5	Camshaft Cap Bolts	12	1.2	106 in·lb	S
6	Spark Plugs	13	1.3	115 in·lb	
7	Cylinder Head Jacket Plugs	22	2.2	16	L
8	Camshaft Sprocket Bolts	15	1.5	11	L
9	Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
10	Cylinder Head Bolt (M6)	12	1.2	106 in·lb	S
11	Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
12	Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
13	Rear Camshaft Chain Guide Bolt	17	1.7	13	
14	Camshaft Chain Tensioner Cap Bolt	5.0	0.51	44 in·lb	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Muffler Body Mounting Bolt	30	3.1	22	
2	Muffler Cover Bolt	9.8	1.0	87 in·lb	
3	Muffler Body Rear Cover Bolts	7.9	0.81	70 in·lb	
4	Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	
5	Exhaust Pipe Mounting Bolt	20	2.0	15	
6	Muffler Cover Clamp Screw	6.9	0.70	61 in·lb	
7	Muffler Body Clamp Bolt	13	1.3	115 in·lb	

R: Replacement Parts

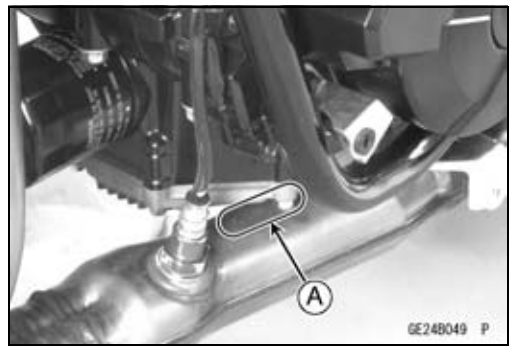
Exhaust System Identification

Exhaust System

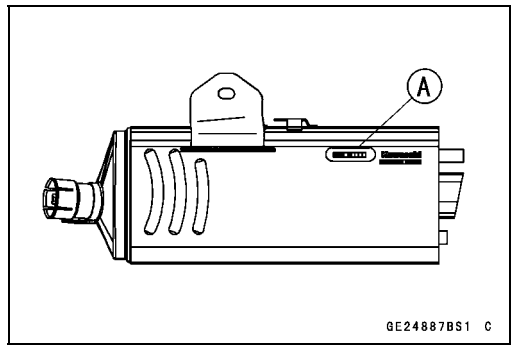
MANIFOLD	MUFFLER BODY	SPECIFICATION	MARKETING CODE
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0177 Mark: KHI M 140	Non-Catalyst P/No. 18091-0860 Mark: KHI K 620	WVTA (FULL AB-2) BR IN	EX300A/B EX300A/B EX300A
Honeycomb Type Catalyst without Oxygen Sensor P/No. 39178-0179 Mark: KHI M 142	Non-Catalyst P/No. 18091-0860 Mark: KHI K 620 EPA Noise Emission Control Information	US CAL CA AU CO	EX300A/B EX300A/B EX300A/B EX300A/B EX300A

GE24888B F

Manifold Mark Position [A]

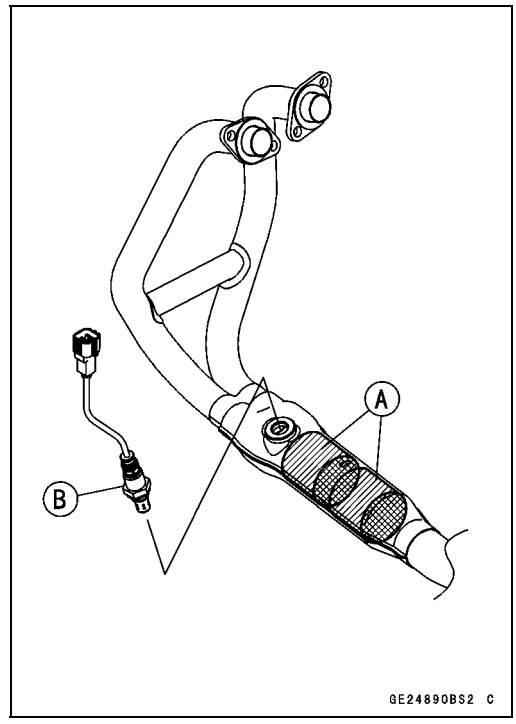


Muffler Body Mark Position [A]

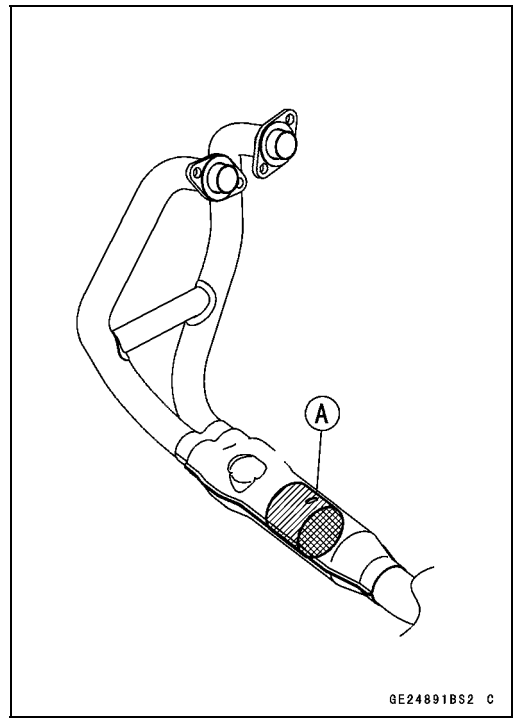


Exhaust System Identification

Honeycomb Type Catalyst Position [A]
Oxygen Sensor [B]



Honeycomb Type Catalyst Positions [A] (without Oxygen Sensor)



Specifications

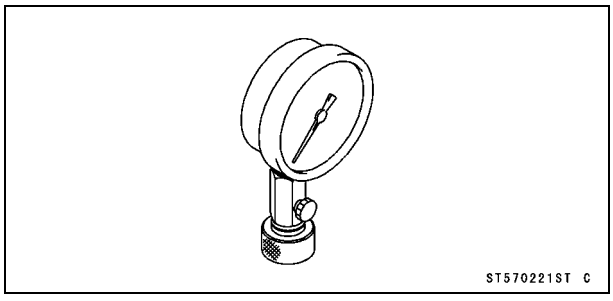
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	32.843 ~ 32.957 mm (1.2930 ~ 1.2975 in.)	32.74 mm (1.289 in.)
Intake	33.843 ~ 33.957 mm (1.3324 ~ 1.3369 in.)	33.74 mm (1.328 in.)
Camshaft Journal, Camshaft Cap Clearance	0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)	0.16 mm (0.0063 in.)
Camshaft Journal Diameter	23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)	23.92 mm (0.942 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.9449 ~ 0.9457 in.)	24.08 mm (0.948 in.)
Camshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Cylinder Head		
Cylinder Compression	(Usable Range) 1 120 ~ 1 698 kPa (11.4 ~ 17.3 kgf/cm², 162 ~ 246 psi) at 500 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)	– – –
Intake	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	– – –
Valve Head Thickness:		
Exhaust	0.8 mm (0.032 in.)	0.5 mm (0.020 in.)
Intake	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)	4.44 mm (0.175 in.)
Intake	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)	4.46 mm (0.176 in.)
Valve Guide Inside Diameter:		
Exhaust	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.180 in.)
Intake	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.180 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.08 ~ 0.15 mm (0.0031 ~ 0.0059 in.)	0.33 mm (0.013 in.)
Intake	0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in.)	0.27 mm (0.011 in.)
Valve Seat Cutting Angle	32°, 45°, 67.5°	– – –
Valve Seating Surface:		
Width:		
Exhaust	0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)	– – –
Intake	0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)	– – –
Outside Diameter:		
Exhaust	19.3 ~ 19.5 mm (0.7598 ~ 0.7677 in.)	– – –
Intake	23.1 ~ 24.1 mm (0.9094 ~ 0.9488 in.)	– – –
Valve Spring Free Length:		
Exhaust	39.5 mm (1.555 in.)	38.0 mm (1.50 in.)
Intake	39.5 mm (1.555 in.)	38.0 mm (1.50 in.)

Specifications

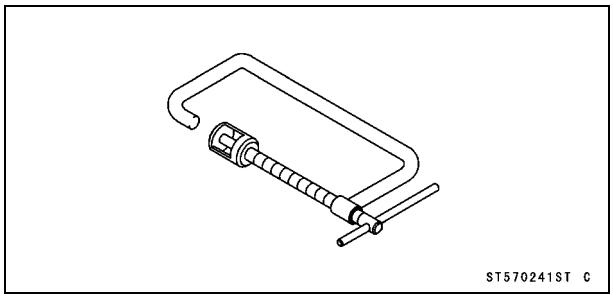
Item	Standard	Service Limit
Cylinder, Pistons		
Cylinder Inside Diameter	61.994 ~ 62.010 mm (2.4407 ~ 2.4413 in.)	62.09 mm (2.4445 in.)
Piston Diameter	61.969 ~ 61.984 mm (2.4397 ~ 2.4403 in.)	61.82 mm (2.4339 in.)
Piston/Cylinder Clearance	0.010 ~ 0.041 mm (0.0004 ~ 0.0016 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)	0.16 mm (0.0063 in.)
Piston Ring Groove Width:		
Top	0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)	0.92 mm (0.0362 in.)
Second	0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)	0.91 mm (0.0358 in.)
Piston Ring Thickness:		
Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Second	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)	0.6 mm (0.024 in.)
Second	0.40 ~ 0.55 mm (0.0157 ~ 0.0217 in.)	0.9 mm (0.035 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.0 mm (0.039 in.)

Special Tools and Sealant

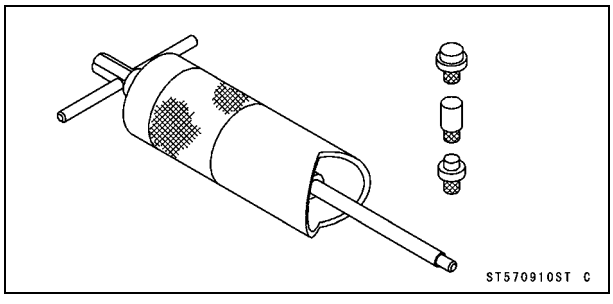
Compression Gauge, 20 kgf/cm²:
57001-221



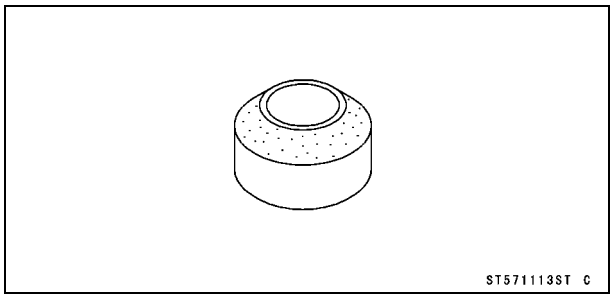
Valve Spring Compressor Assembly:
57001-241



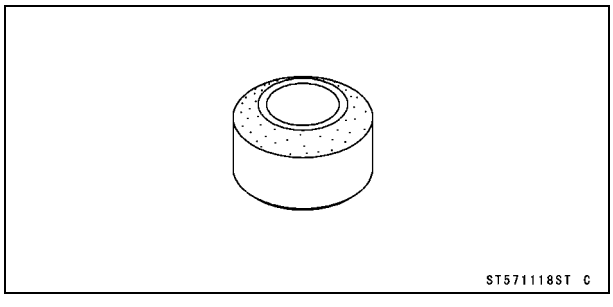
Piston Pin Puller Assembly:
57001-910



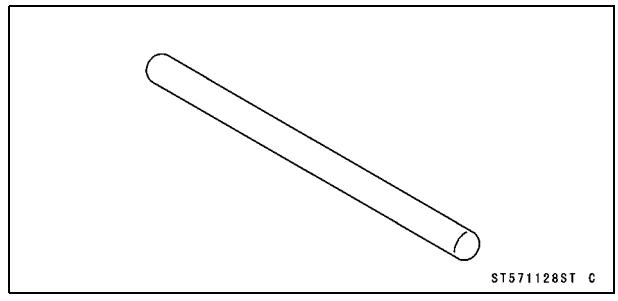
Valve Seat Cutter, 45° - ϕ24.5:
57001-1113



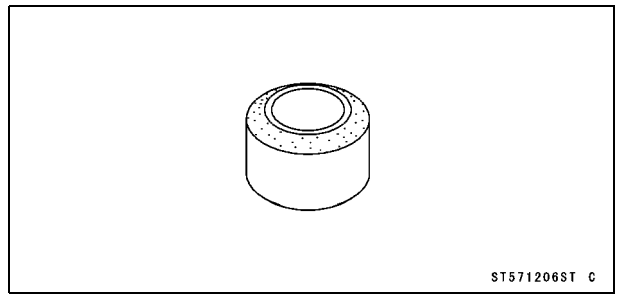
Valve Seat Cutter, 32° - ϕ25:
57001-1118



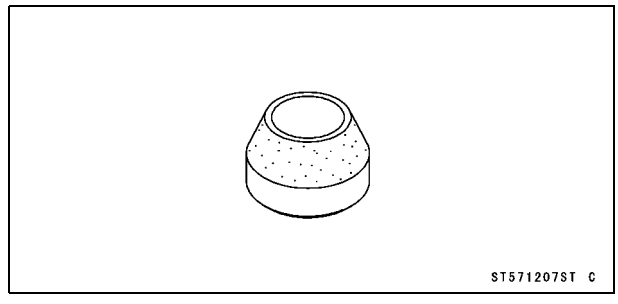
Valve Seat Cutter Holder Bar:
57001-1128



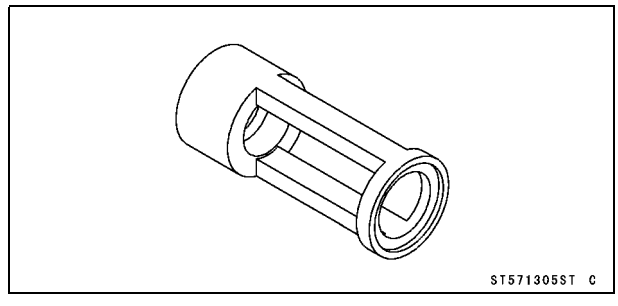
Valve Seat Cutter, 32° - ϕ22:
57001-1206



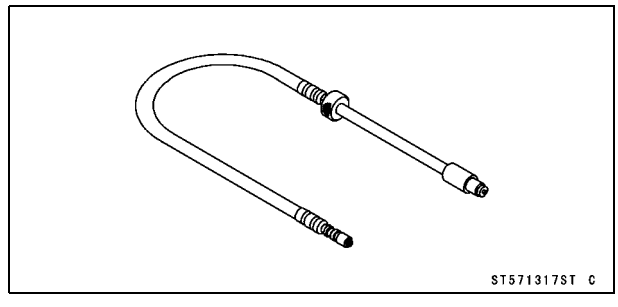
Valve Seat Cutter, 67.5° - ϕ22:
57001-1207



Valve Spring Compressor Adapter, ϕ16:
57001-1305

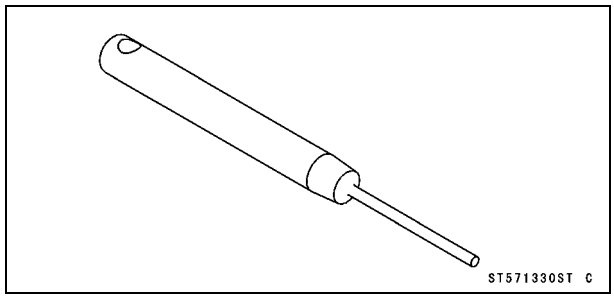


Compression Gauge Adapter, M10 × 1.0:
57001-1317

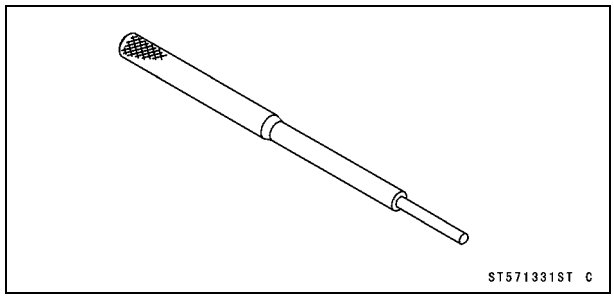


Special Tools and Sealant

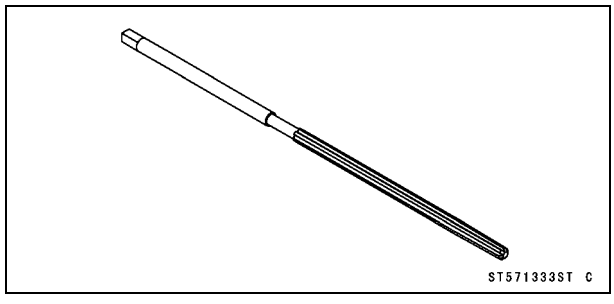
Valve Seat Cutter Holder, ϕ4.5:
57001-1330



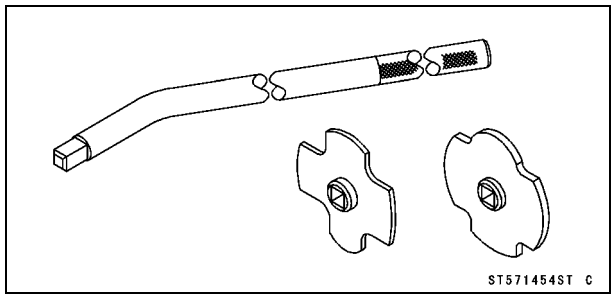
Valve Guide Arbor, ϕ4.5:
57001-1331



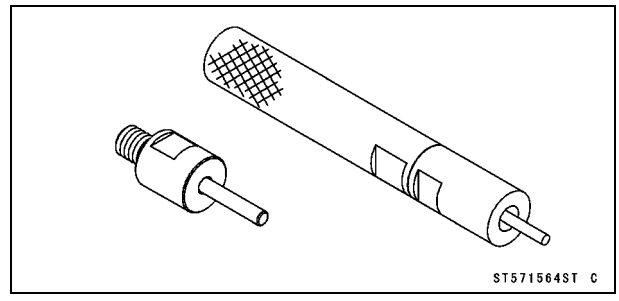
Valve Guide Reamer, ϕ4.5:
57001-1333



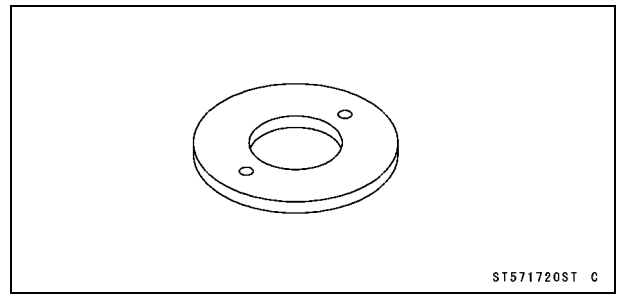
Filler Cap Driver:
57001-1454



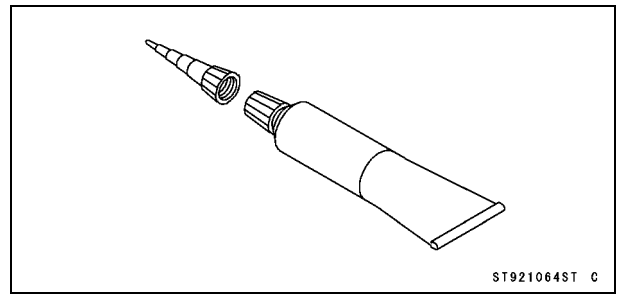
Valve Guide Driver:
57001-1564



Washer:
57001-1720

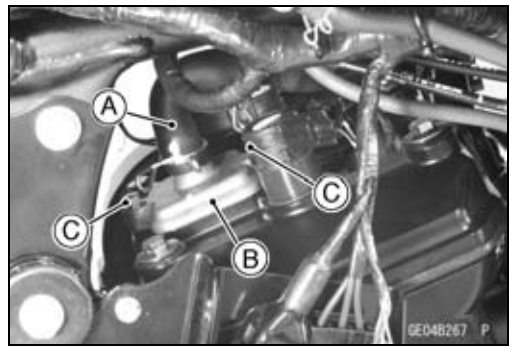


Liquid Gasket, TB1216B:
92104-1064



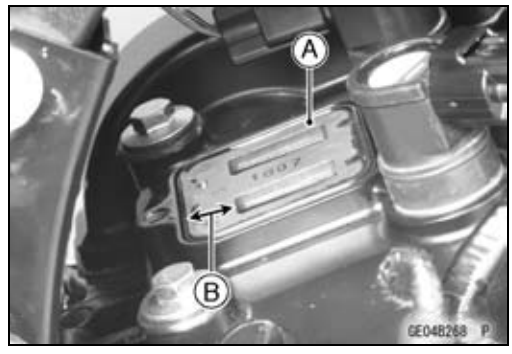
Clean Air System

Air Suction Valve Removal



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the hose [A] from the air suction valve cover [B].
- Remove:
  Air Suction Valve Cover Bolts [C]
  Air Suction Valve Cover [B]
  Air Suction Valve

Air Suction Valve Installation

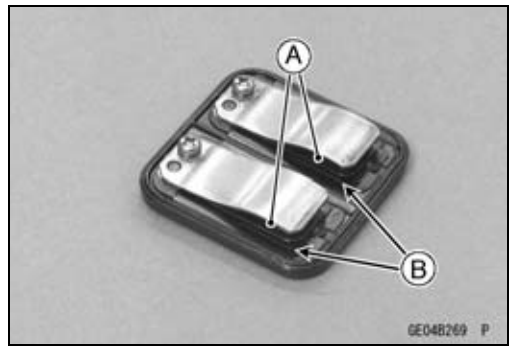


- Install the air suction valve [A] so that its wider side [B] of the reed valve case faces the front.
- Tighten:

  Torque - Air Suction Valve Cover Bolts : 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

Air Suction Valve Inspection

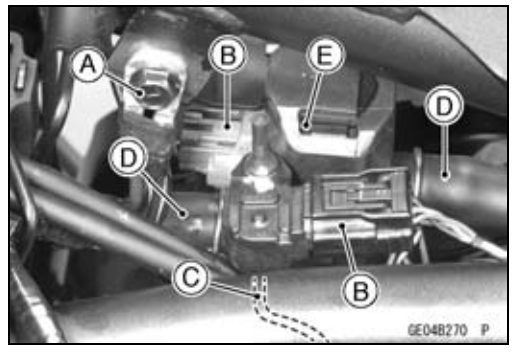


- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds for cracks, folds, warps, heat damage or other damage.
- ★If there is any doubt as to the condition of the reeds [A], replace the air suction valve as an assembly.
- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.
- If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.

NOTICE

Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

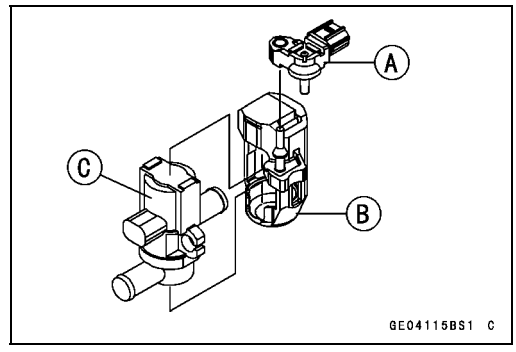
Air Switching Valve Removal



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Remove the frame ground terminal bolt [A].
- Disconnect the connectors [B].
- Remove the hose [C] from the intake air pressure sensor.
- Remove the hoses [C] from the air suction valve cover and air cleaner housing fitting, and remove the air switching valve assembly [D].

Clean Air System

- Remove the hoses from the air switching valve assembly.
- Remove:
  Intake Air Pressure Sensor [A]
  Damper [B]
  Air Switching Valve [C]



NOTICE

Never drop the air switching valve especially on a hardsurface. Such a shock to the air switching valve can damaged it.

Air Switching Valve Installation

- Installation is the reverse of removal.
- Run the lead and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Air Switching Valve Operation Test

- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

Air Switching Valve Unit Test

- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

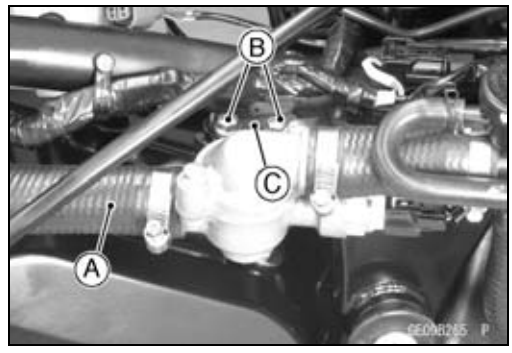
Clean Air System Hose Inspection

- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve cover.

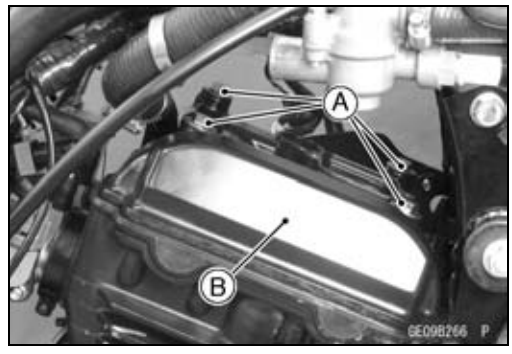
★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

Cylinder Head Cover Removal



- Remove:
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Air Switching Valve (see Air Switching Valve Removal)
  Air Suction Valve Cover (see Air Suction Valve Removal)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Water Hose [A]
  Bolts [B] and Bracket [C]

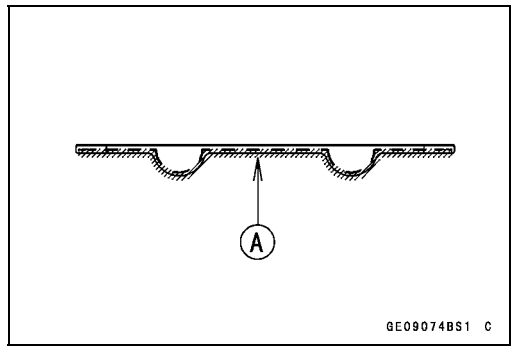


- Remove:
  Cylinder Head Cover Bolts [A]
  Cylinder Head Cover [B]

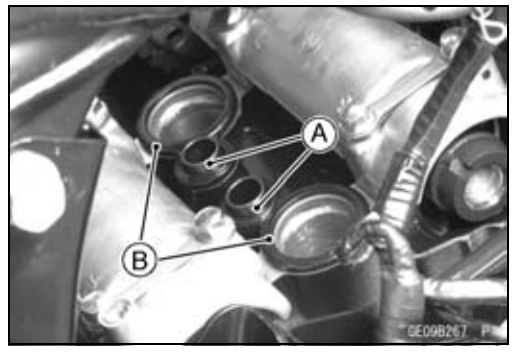
Cylinder Head Cover Installation

- Replace the head cover gasket with a new one.
- Clean off any oil or dirt and apply liquid gasket [A] to the head cover gasket as shown.

  Sealant - Liquid Gasket, TB1216B: 92104-1064



- Install the new head cover gasket.

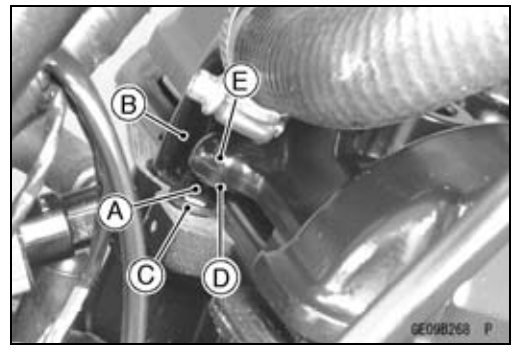


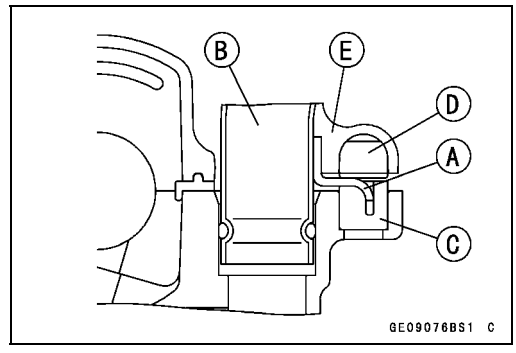
- Install:
  Dowel Pins [A]
  Plug Hole Gaskets [B]

Cylinder Head Cover

- Insert the hook [A] of the water pipe [B] in the groove of the damper [C] as shown.
  Damper [D]
- Install the head cover [E], and tighten the bolts.

  Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install the removed parts (see appropriate chapters).





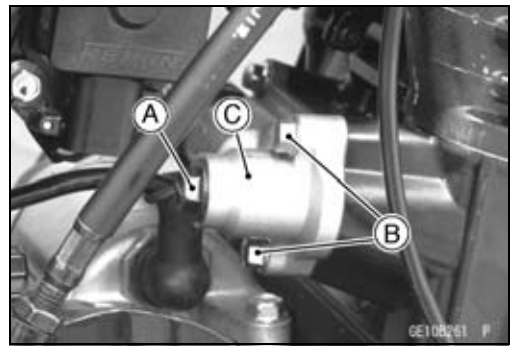
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

NOTICE

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing and damage the valves.

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Cap Bolt [A]
  Mounting Bolts [B]
  Camshaft Chain Tensioner [C]

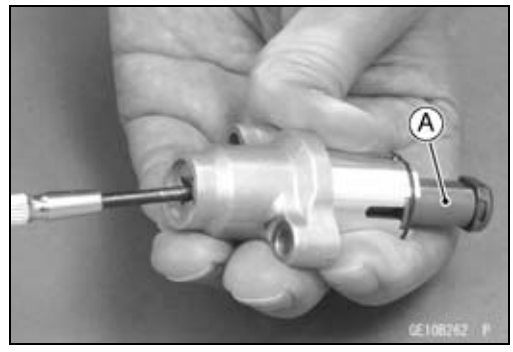


Camshaft Chain Tensioner Installation

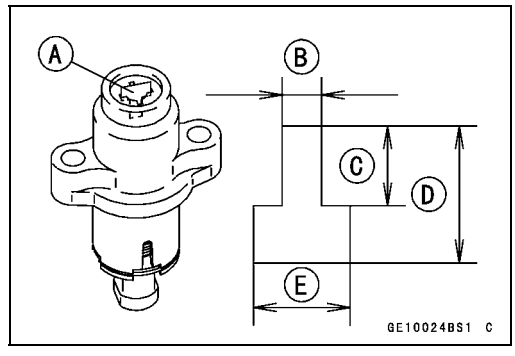
- While compressing the push rod [A], turn it clockwise with a suitable screwdriver until the rod stopped.

NOTICE

Do not turn the rod counterclockwise before installing the tensioner. This could detach the rod and the tensioner cannot be reinstalled.



- Replace the camshaft chain tensioner gasket with a new one.
- While holding the rod in position with a suitable push rod holder plate [A] install the tensioner on the cylinder block.
  3.5 mm (0.14 in.) [B]
  7 mm (0.28 in.) [C]
  12 mm (0.47 in.) [D]
  8.5 mm (0.33 in.) [E]



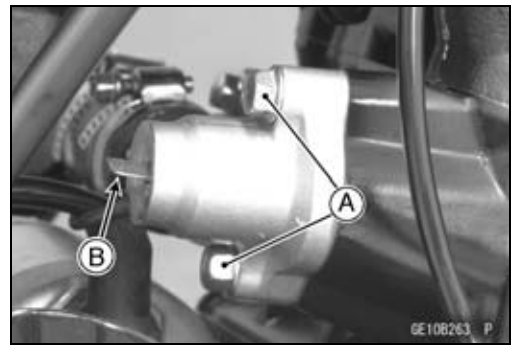
Camshaft Chain Tensioner

- Tighten:

  Torque - Camshaft Chain Tensioner Mounting Bolts [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Take out the holder plate [B].
- Replace the O-ring with a new one and apply grease to it.
- Tighten the cap bolt.

  Torque - Camshaft Chain Tensioner Cap Bolt: 5.0 N·m (0.51 kgf·m, 44 in·lb)

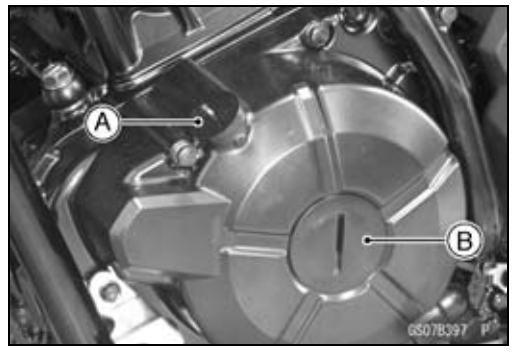


Camshaft, Camshaft Chain

Camshaft Removal

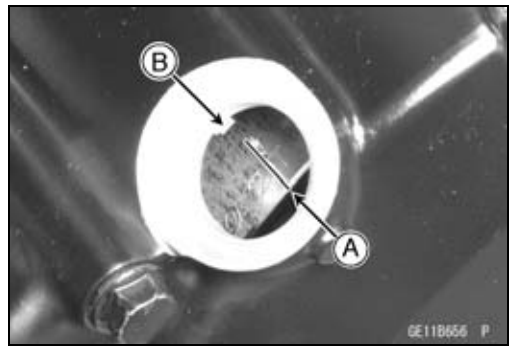
- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Plugs [A] [B]

Special Tool - Filler Cap Driver: 57001-1454



- Position the crankshaft at #2 piston TDC.

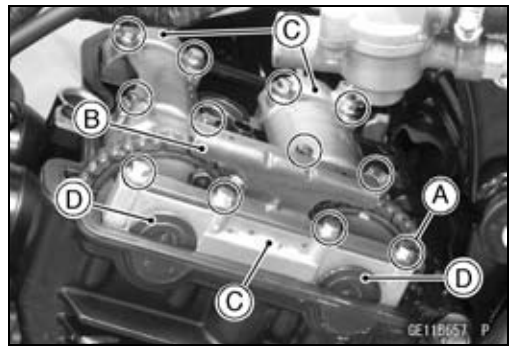
○Using a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the "2T" mark [A] on the alternator rotor is aligned with the projection [B] in the inspection window on the alternator cover.

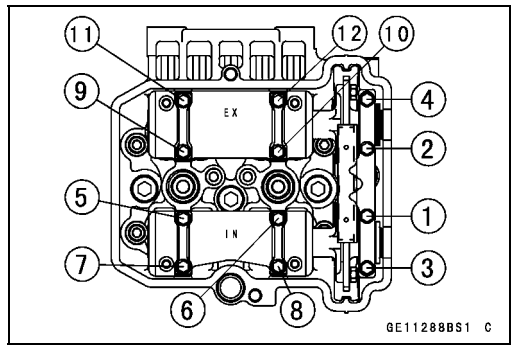


- Remove:
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  Camshaft Cap Bolts [A]
  Plates
  Upper Chain Guide [B]
  Camshaft Caps [C]
  Camshafts [D]

○Loosen the camshaft cap bolts gradually and evenly as shown sequence [1 ~ 12].

- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.

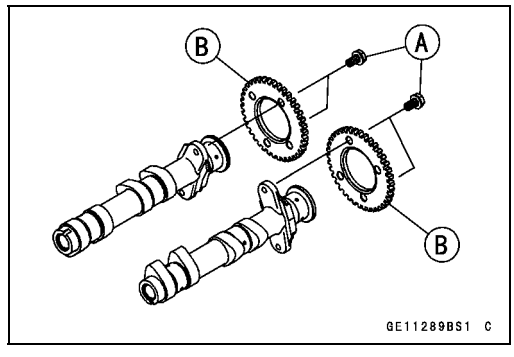




- Remove:
  Camshaft Sprocket Bolts [A]
  Camshaft Sprockets [B]

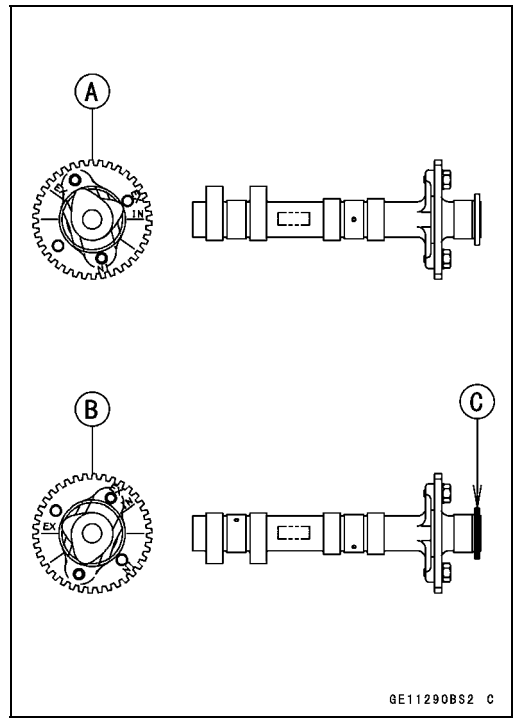
NOTICE

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.



Camshaft, Camshaft Chain

Camshaft Installation



- Install the camshaft sprockets as shown.
  Intake Camshaft Sprocket [A]
  Exhaust Camshaft Sprocket [B]

○The exhaust camshaft has the groove [C].

- Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts and tighten them.

Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply molybdenum disulfide oil solution to all cam parts and journals.

★If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.

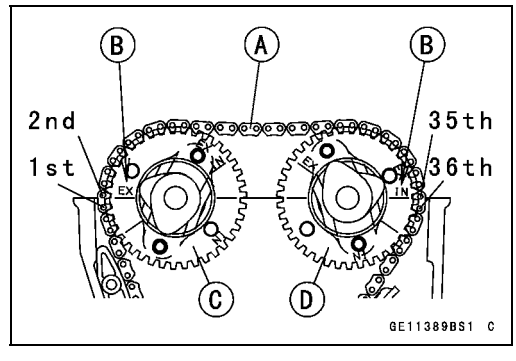
NOTE

○*Be sure to operate from the engine left side.*

- Position the crankshaft at #2 piston TDC (see Camshaft Removal).

NOTICE

The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.



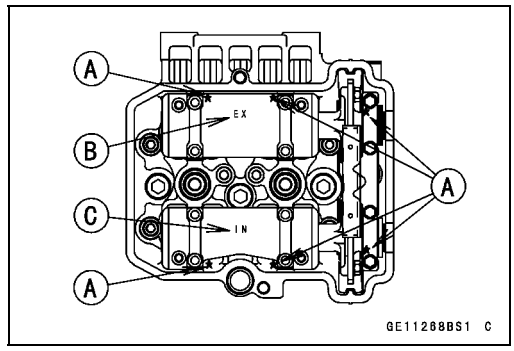
- Engage the camshaft chain [A] with the camshaft sprockets.
- Pull the tension side (exhaust side) of the chain taut to install the chain on the sprockets.

○Timing marks [B] align with the cylinder head upper surface.
  Exhaust Camshaft Sprocket [C]
  Intake Camshaft Sprocket [D]

○Count the camshaft chain link pins as shown to verify that the sprocket are positioned correctly.

Camshaft, Camshaft Chain

- Install the six dowel pins on the ★ marks [A].
- Install the camshaft caps as shown, noting the “EX” [B] and “IN” [C] marks.

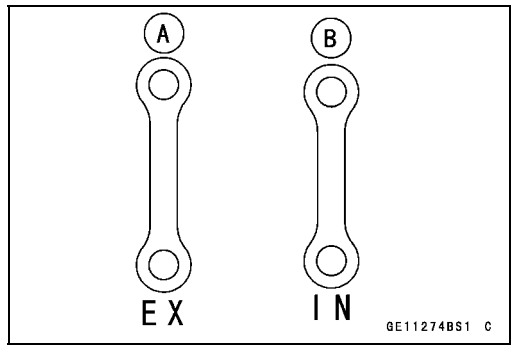


NOTICE

The camshaft caps are machined with the cylinder head. So, if a cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings.

- Install the plates on the camshaft caps.

○The exhaust side plates [A] are longer than the intake side plates [B].

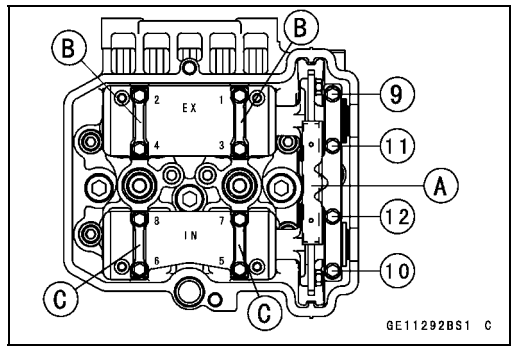


- Install the upper chain guide [A].
- First tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence.

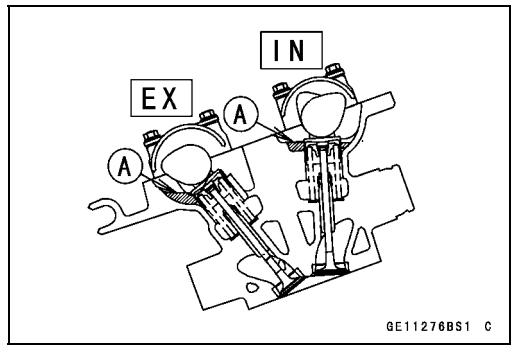
Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

Plates (EX) [B]
Plates (IN) [C]

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).

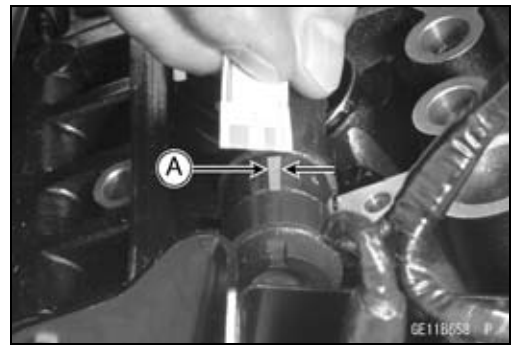


- Finally, inject [A] the engine oil into 8 places on the cylinder head as shown.
- Install the cylinder head cover (see Cylinder Head Cover Installation).



Camshaft, Camshaft Chain

Camshaft, Camshaft Cap Wear Inspection



- Remove:
  Upper Chain Guide (see Camshaft Removal)
  Camshaft Caps (see Camshaft Removal)
- Cut the strips of plastigauge to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Measure each clearance between the camshaft journal and the camshaft cap using the plastigauge (press gauge) [A].
- Tighten the camshaft cap bolts (see Camshaft Installation).

NOTE

○*Do not turn the camshaft when the plastigauge is between the journal and camshaft cap.*

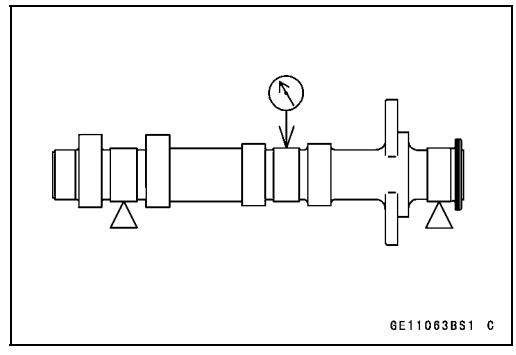
Camshaft Journal, Camshaft Cap Clearance
Standard: 0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)
Service Limit: 0.16 mm (0.0063 in.)

★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter
Standard: 23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)
Service Limit: 23.92 mm (0.942 in.)

★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
★If the clearance still remains out of the service limit, replace the cylinder head unit.

Camshaft Runout Inspection



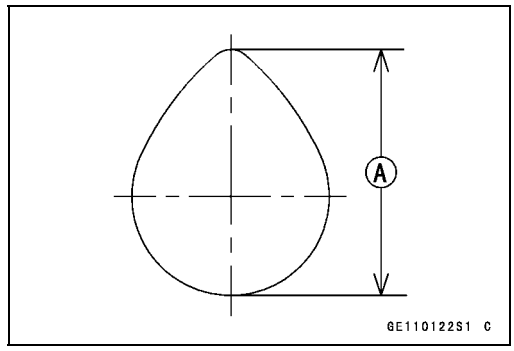
- Remove the camshafts (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge at the specified place as shown.

★If the runout exceeds the service limit, replace the camshaft.

Camshaft Runout
Standard: TIR 0.02 mm (0.0008 in.) or less
Service Limit: TIR 0.1 mm (0.004 in.)

Camshaft, Camshaft Chain

Cam Wear Inspection



- Remove the camshafts (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

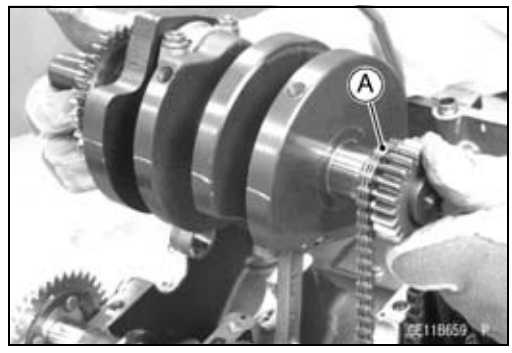
Standard:

Exhaust	**32.843 ~ 32.957 mm (1.2930 ~ 1.2975 in.)**
Intake	**33.843 ~ 33.957 mm (1.3324 ~ 1.3369 in.)**

Service Limit:

Exhaust	**32.74 mm (1.289 in.)**
Intake	**33.74 mm (1.328 in.)**

Camshaft Chain Removal



- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.

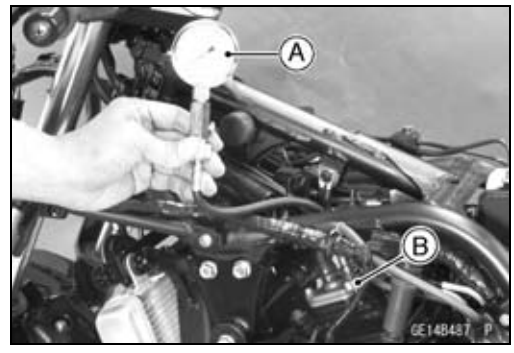
Cylinder Head

Cylinder Compression Measurement

NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Spark Plugs (see Spark Plug Replacement in the Periodic Maintenance chapter)



- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1317

Cylinder Compression
Usable Range: 1 120 ~ 1 698 kPa (11.4 ~ 17.3 kgf/cm², 162 ~ 246 psi) at 500 r/min (rpm)

- Repeat the measurement for the other cylinder.
- Install the spark plugs.

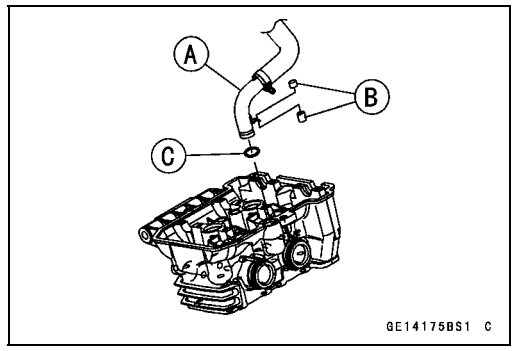
Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

○The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range.	Gas leakage around cylinder head	Replace damaged check gasket and cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

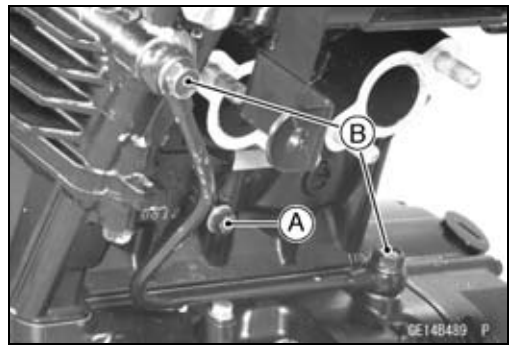
Cylinder Head

Cylinder Head Removal

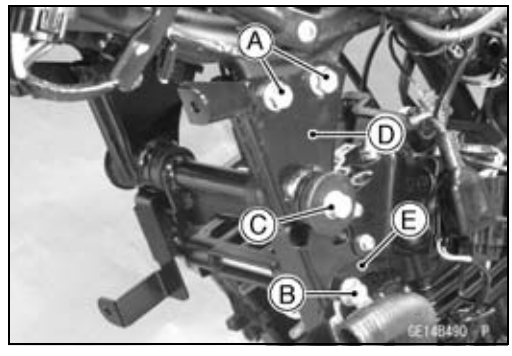


- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Camshafts (see Camshaft Removal)
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Exhaust Pipe (see Exhaust Pipe Removal)
  Water Pipe [A]
  Dampers [B]
  O-rings [C]

- Remove:
  Front Camshaft Chain Guide [A]



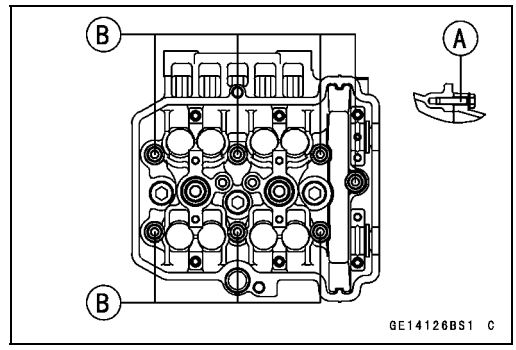
- Remove the drain bolt [A] to drain the coolant from the cylinder.
- Remove the oil pipe banjo bolt [B].



- Remove:
  Upper Engine Mounting Bracket Nuts and Bolts [A] (Both Sides)
  Engine Mounting Bracket Nut and Bolt [B] (L = 210)
  Engine Mounting Bracket Nut and Bolt [C] (L = 240)
  Upper Engine Mounting Bracket [D] (Both Sides)
  Engine Mounting Bracket [E]

Cylinder Head

- Remove:
  M6 Cylinder Head Bolt [A]
  M8 Cylinder Head Bolts [B]
  Cylinder Head

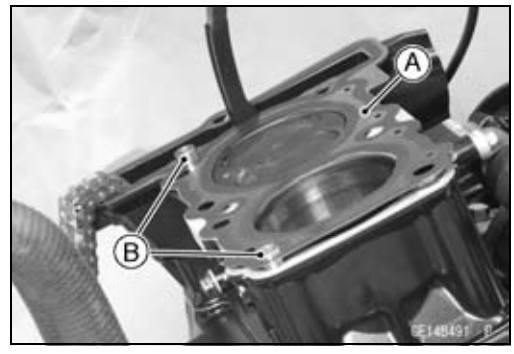


Cylinder Head Installation

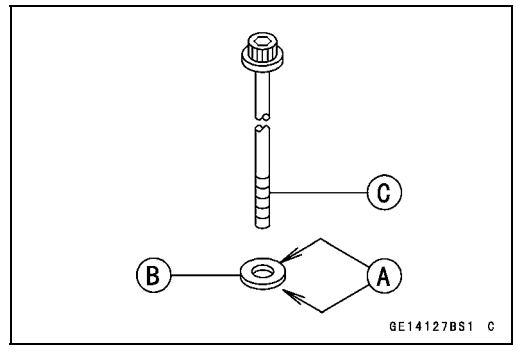
NOTE

○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

- Replace the cylinder head gasket [A] with a new one.
- Install the dowel pins [B] and cylinder head gasket.



- Replace the cylinder head bolt washers with new ones.
- Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers [B] and the threads of the head bolts [C].

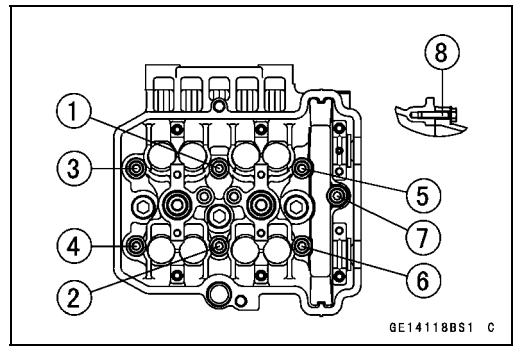


- Tighten the M8 cylinder head bolts following the tightening sequence [1 ~ 7].
  146 mm (5.75 in.) [1 ~ 6]
  115 mm (4.53 in.) [7]

  Torque - Cylinder Head Bolts (M8, L = 146): 32 N·m (3.3 kgf·m, 24 ft·lb)
  Cylinder Head Bolt (M8, L = 115): 32 N·m (3.3 kgf·m, 24 ft·lb)

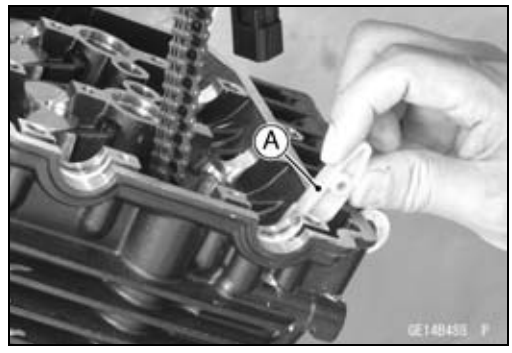
- Tighten the M6 cylinder head bolt [8].

  Torque - Cylinder Head Bolt (M6): 12 N·m (1.2 kgf·m, 106 in·lb)

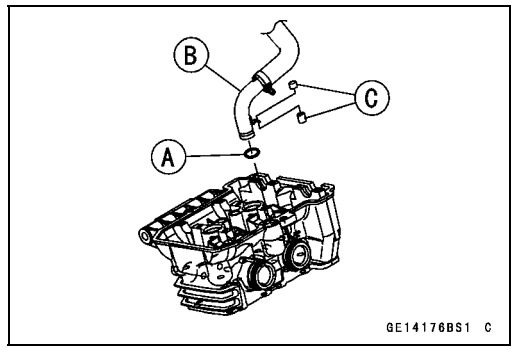


Cylinder Head

● Install:
Front Camshaft Chain Guide [A]



● Replace the O-ring [A] with a new one.
● Apply grease to the O-ring.
● Install the water pipe [B] and dampers [C] (see Cylinder Head Cover Installation).
● Install the removed parts (see appropriate chapters).

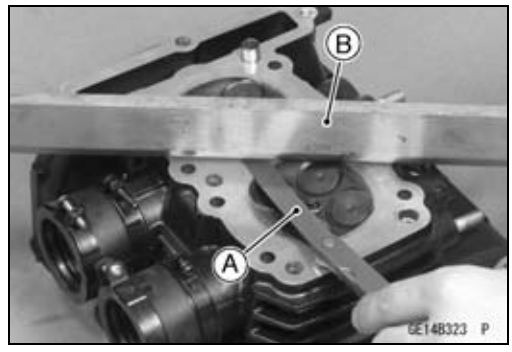


Cylinder Head Warp Inspection

● Clean the cylinder head.
● Lay a straightedge across the lower surface of the cylinder head at several positions.
● Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp
Standard: – – –
Service Limit: 0.05 mm (0.002 in.)

★If the cylinder head is warped more than the service limit, replace it.
★If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



Valves

Valve Clearance Inspection

- Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

Valve Clearance Adjustment

- Refer to the Valve Clearance Adjustment in the Periodic Maintenance chapter.

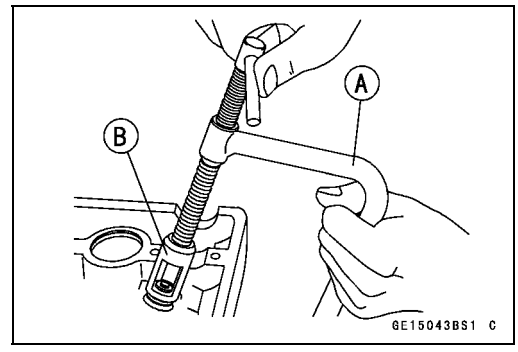
Valve Removal

- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Valve Lifter and Shim

○Mark and record the valve lifter and shim locations so they can be installed in their original positions.

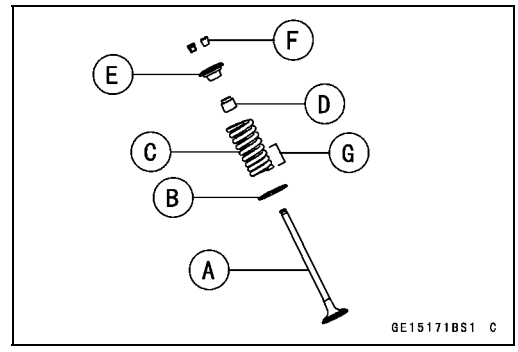
- Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Assembly [A]: 57001-241
Valve Spring Compressor Adapter, ϕ16 [B]: 57001-1305



Valve Installation

- Replace the oil seal with a new one.
- Apply engine oil to the lip of the oil seal.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the spring so that the closed coil end faces downwards.
  Valve Stem [A]
  Spring Seat [B]
  Valve Spring (Yellow-Green) [C]
  Oil Seal [D]
  Retainer [E]
  Split Keepers [F]
  Closed Coil End [G]



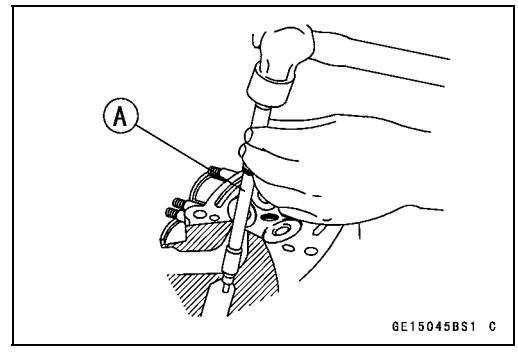
Valve Guide Removal

- Remove:
  Valve (see Valve Removal)
  Oil Seal
  Spring Seat
- Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

NOTICE

Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.

Special Tool - Valve Guide Arbor, ϕ4.5: 57001-1331



Valves

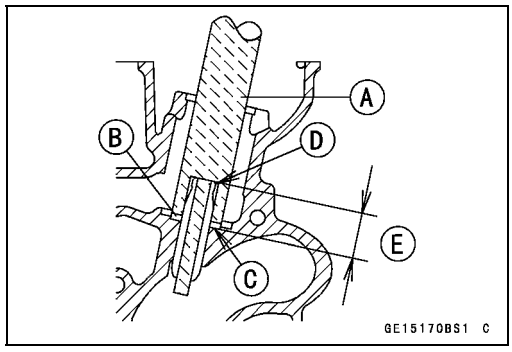
Valve Guide Installation

- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).

NOTICE
Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.

- Using the valve guide driver [A] and washer [B], press and insert the valve guide in until the washer surface [C] touches the head surface [D].
  15.3 ~ 15.5 mm (0.60 ~ 0.61 in.) [E]

Special Tools - Valve Guide Driver: 57001-1564
Washer: 57001-1720

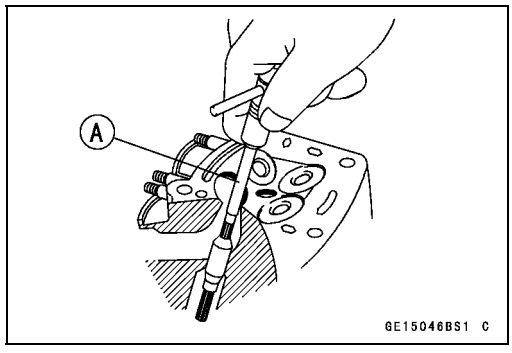


- Wait until the cylinder head cools down and then ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

○Turn the reamer in a clockwise direction until the reamer turns freely in the guide. Never turn the reamer counter-clockwise or it will be dulled.

○Once the guides are reamed they must be cleaned thoroughly.

Special Tool - Valve Guide Reamer, ϕ4.5: 57001-1333

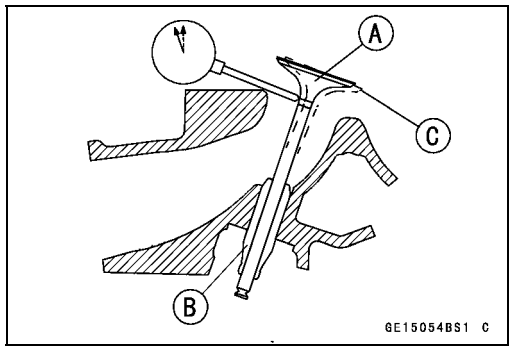


Valve-to-Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.



Valves

NOTE

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust **0.08 ~ 0.15 mm (0.0031 ~ 0.0059 in.)**

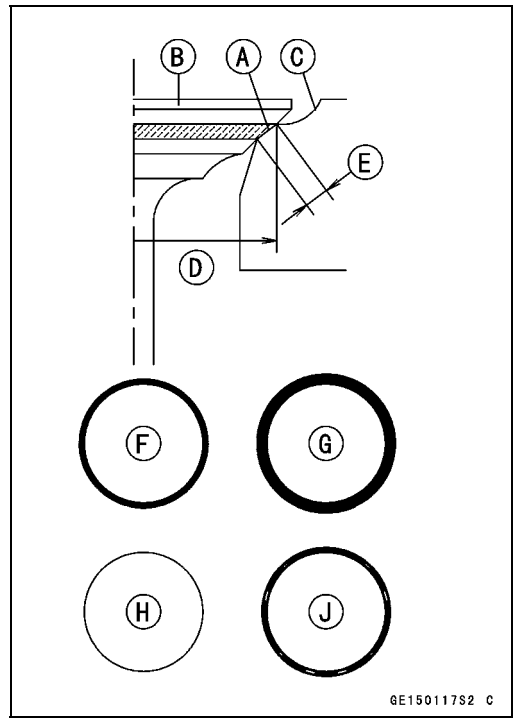
Intake **0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in.)**

Service Limit:

Exhaust **0.33 mm (0.013 in.)**

Intake **0.27 mm (0.011 in.)**

Valve Seat Inspection



- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Seat Repair).

Valve Seating Surface Outside Diameter

Standard:

Exhaust **19.3 ~ 19.5 mm (0.7598 ~ 0.7677 in.)**

Intake **23.1 ~ 24.1 mm (0.9094 ~ 0.9488 in.)**

○Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.

Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

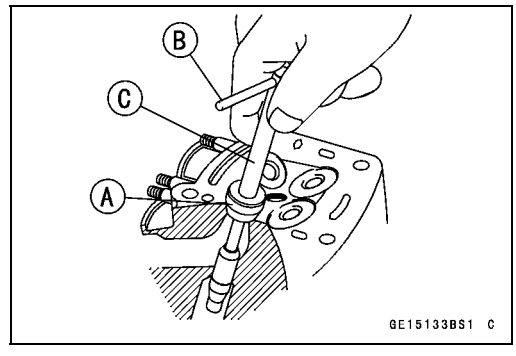
Valve Seating Surface Width

Standard:

Exhaust **0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)**

Intake **0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)**

Valve Seat Repair



- Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder Bar [B]: 57001 -1128

Valve Seat Cutter Holder, ϕ4.5 [C]: 57001 -1330

[For Exhaust Valve Seat]

Valve Seat Cutter, 45° - ϕ24.5: 57001-1113

Valve Seat Cutter, 32° - ϕ22: 57001-1206

Valve Seat Cutter, 67.5° - ϕ22: 57001-1207

[For Intake Valve Seat]

Valve Seat Cutter, 45° - ϕ24.5: 57001-1113

Valve Seat Cutter, 32° - ϕ25: 57001-1118

Valve Seat Cutter, 67.5° - ϕ22: 57001-1207

★If the manufacturer's instructions are not available, use the following procedure.

Valves

Seat Cutter Operation Care

1. This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

NOTE

○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

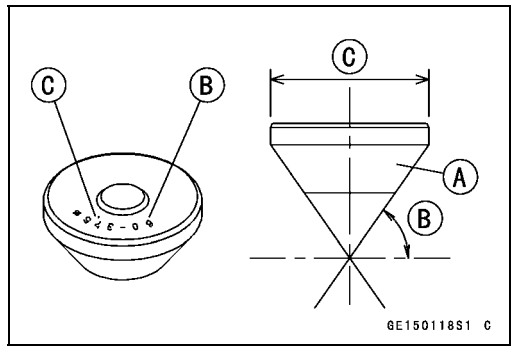
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]

37.5ϕ ..... Outer diameter of cutter [C]



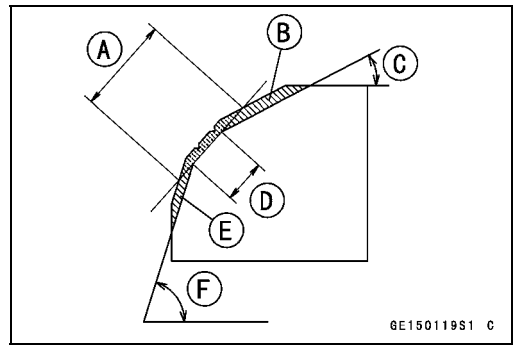
Operating Procedures

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

NOTICE

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

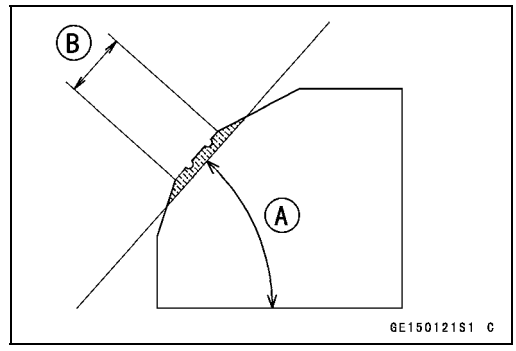
Valves



- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 67.5° cutter
67.5° [F]



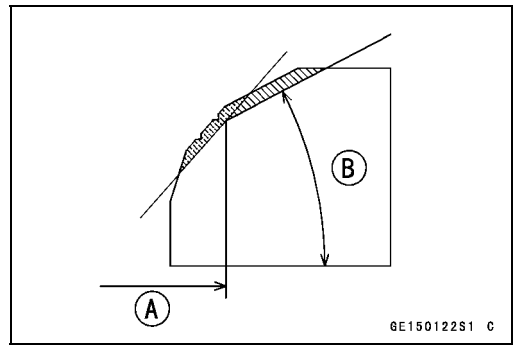
- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

Original Seating Surface [B]

NOTE

○*Remove all pittings of flaws from 45° ground surface.*
○*After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 67.5° grinding operation easier.*
○*When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.*



★If the outside diameter [A] of the seating surface is too large, make the 32° grind described below.

★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

- Grind the seat at a 32° angle [B] until the seat outside diameter is within the specified range.

○To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.

○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

NOTICE

The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

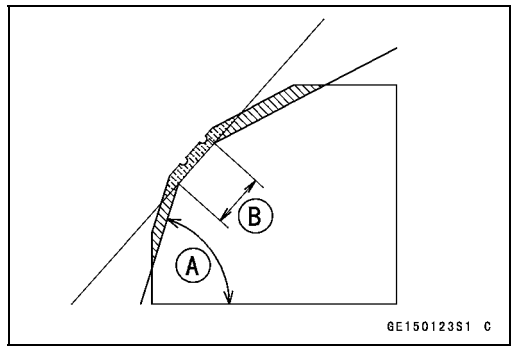
○After making the 32° grind, return to the seat outside diameter measurement step above.

- To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.

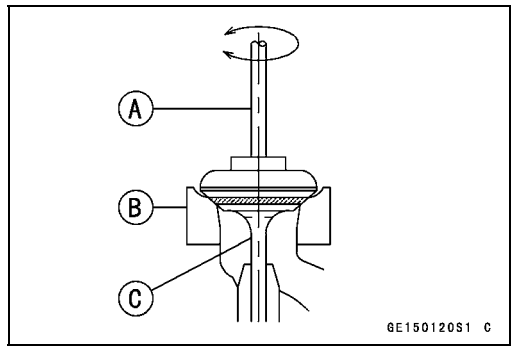
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

Valves

★If the seat width is too wide, make the 67.5° [A] grind described below.
★If the seat width is within the specified range, lap the valve to the seat as described below.
● Grind the seat at a 67.5° angle until the seat width is within the specified range.
○To make the 67.5° grind, fit 67.5° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 67.5° grind, return to the seat width measurement step above.
Correct Width [B]

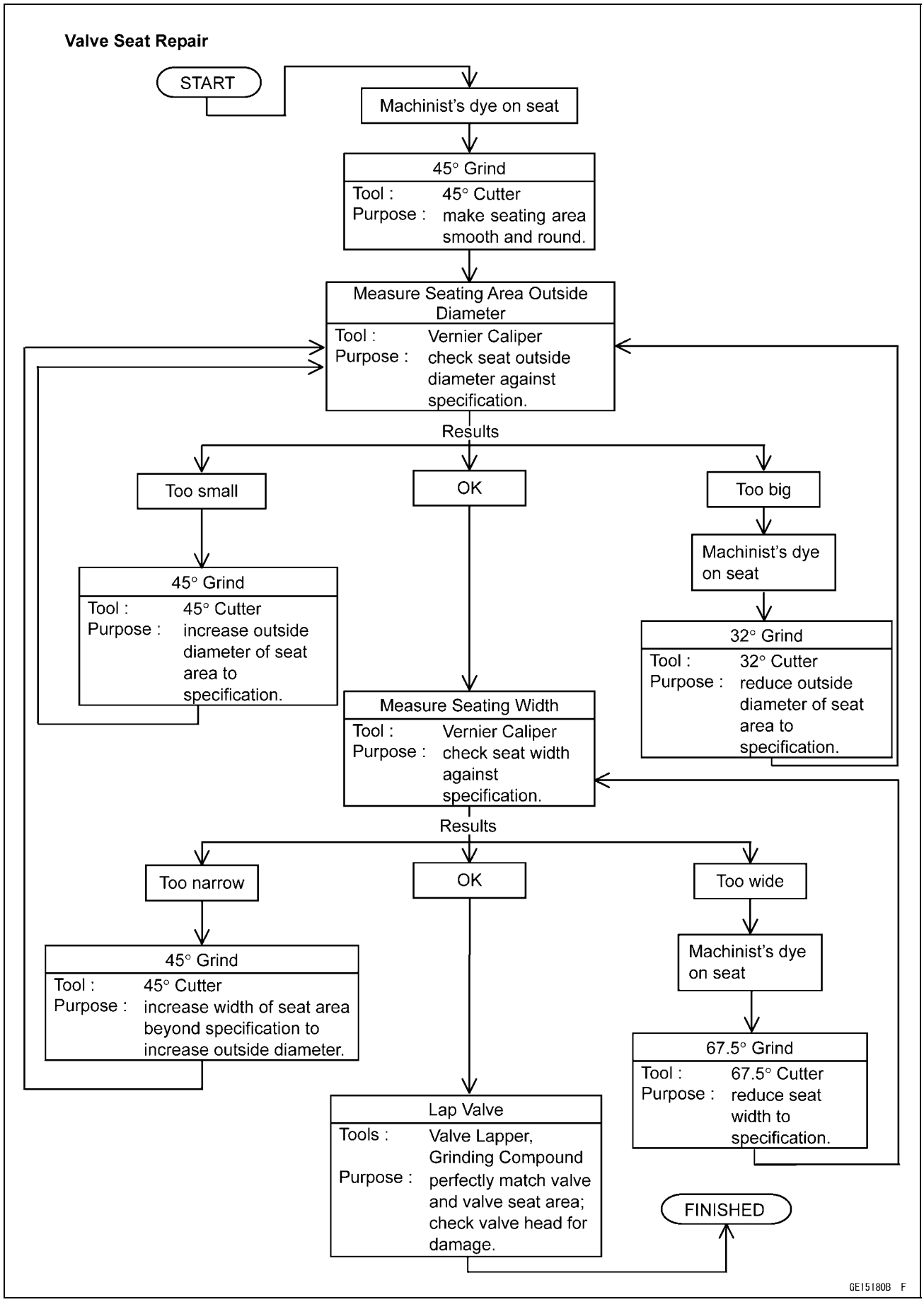


● Lap the valve to the seat, once the seat width and outside diameter are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
Lapper [A]
Valve Seat [B]
Valve [C]



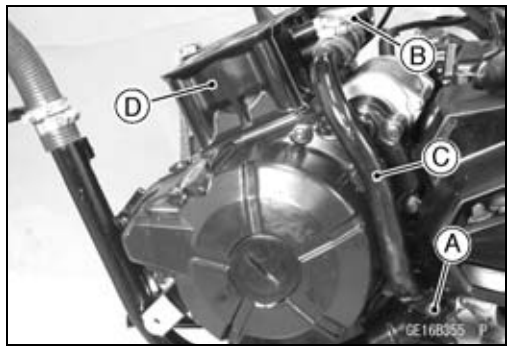
● The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
● Be sure to remove all grinding compound before assembly.
● When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

Valves


Valve Seat Repair
START
Machinist's dye on seat
45° Grind
Tool : 45° Cutter
Purpose : make seating area smooth and round.
Measure Seating Area Outside Diameter
Tool : Vernier Caliper
Purpose : check seat outside diameter against specification.
Results
Too small
OK
Too big
45° Grind
Tool : 45° Cutter
Purpose : increase outside diameter of seat area to specification.
Machinist's dye on seat
32° Grind
Tool : 32° Cutter
Purpose : reduce outside diameter of seat area to specification.
Measure Seating Width
Tool : Vernier Caliper
Purpose : check seat width against specification.
Results
Too narrow
OK
Too wide
45° Grind
Tool : 45° Cutter
Purpose : increase width of seat area beyond specification to increase outside diameter.
Machinist's dye on seat
67.5° Grind
Tool : 67.5° Cutter
Purpose : reduce seat width to specification.
Lap Valve
Tools : Valve Lapper, Grinding Compound
Purpose : perfectly match valve and valve seat area; check valve head for damage.
FINISHED
GE15180B F

Cylinder, Pistons

Cylinder Removal

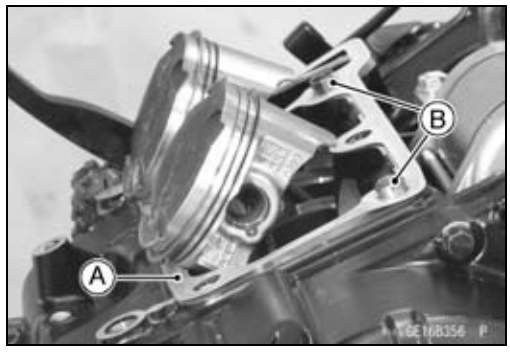


- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Bolt [A]
  Water Hose Clamp Screw (Loosen) [B]
  Water Pipe [C] and Hose
  Cylinder [D]

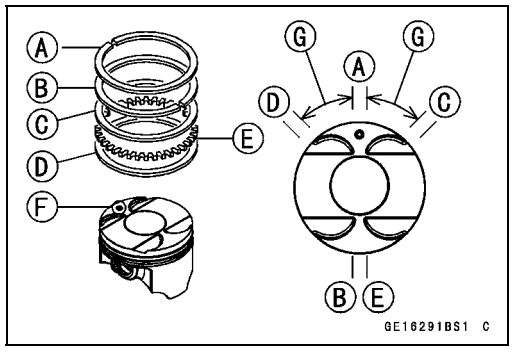
Cylinder Installation

NOTE

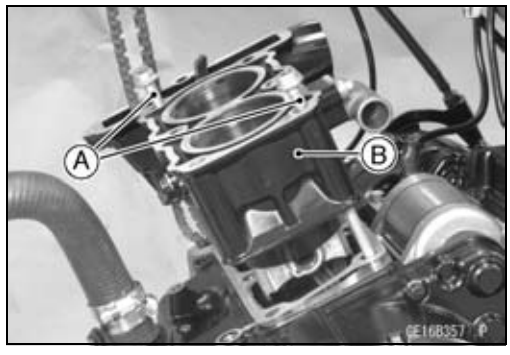
○*If a new cylinder is used, use a new piston ring.*



- Replace the cylinder gasket [A] with a new one.
- Install the dowel pins [B] and new cylinder gasket.



- The piston ring openings must be positioned as shown. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.
  Top Ring [A]
  Second Ring [B]
  Upper Oil Ring Steel Rail [C]
  Lower Oil Ring Steel Rail [D]
  Oil Ring Expander [E]
  Dent [F]
  30 ~ 40° [G]



- Apply molybdenum disulfide oil solution to the cylinder bore, piston rings and piston skirt.
- Prepare two auxiliary head bolts [A] with their head cut.

○Install the two bolts diagonally in the crankcase.

- Position the crankshaft so that the piston heads are almost level.
- Install the cylinder block [B].

○Insert the piston rings with your thumbs.

- Install the removed parts (see appropriate chapters).

Piston Removal

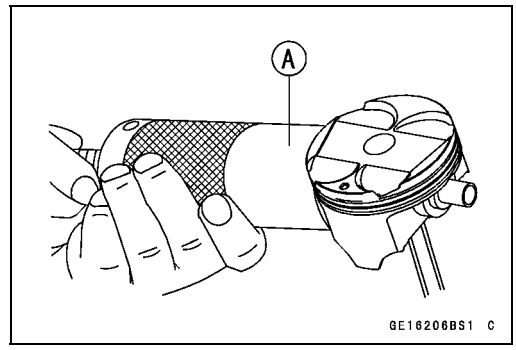
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.

Cylinder, Pistons

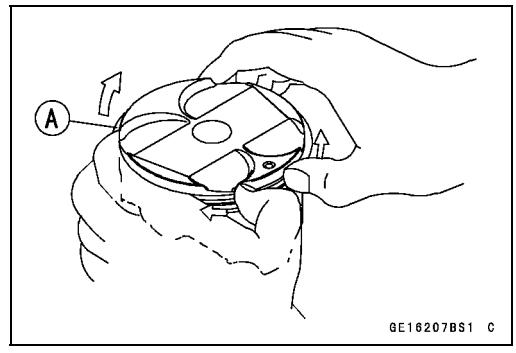
- Remove the piston pins.

Special Tool - Piston Pin Puller Assembly [A]: 57001-910

- Remove the pistons.



- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.

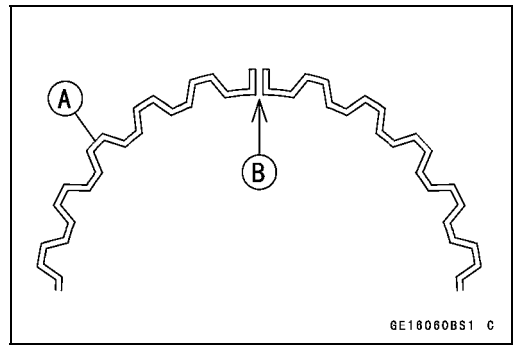


Piston Installation

- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○Release the rail into the bottom piston ring groove.

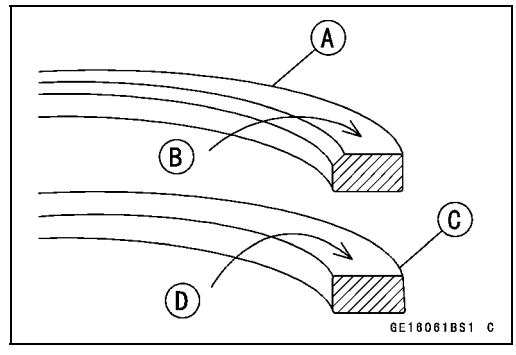


NOTE

○*The oil ring rails have no "top" or "bottom".*

- Do not mix up the top and second ring.
- Install the top ring [A] so that the "1R" mark [B] faces up.
- Install the second ring [C] so that the "RN" mark [D] faces up.

○Apply molybdenum disulfide oil solution to the piston rings.



Cylinder, Pistons

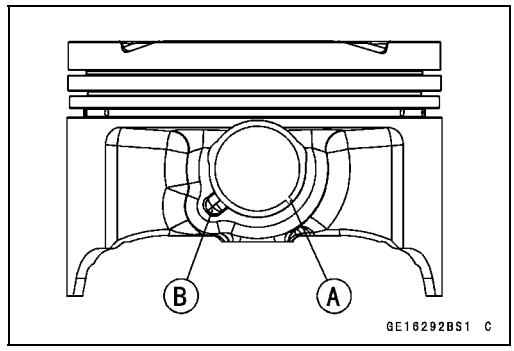
NOTE

○*If a new piston is used, use new piston ring.*

- Install the piston with its dent mark facing forward.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○Apply molybdenum disulfide oil solution to the piston pins and piston journals.

○When installing the piston pin snap ring, compress it only enough to install it and no more.



NOTICE

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

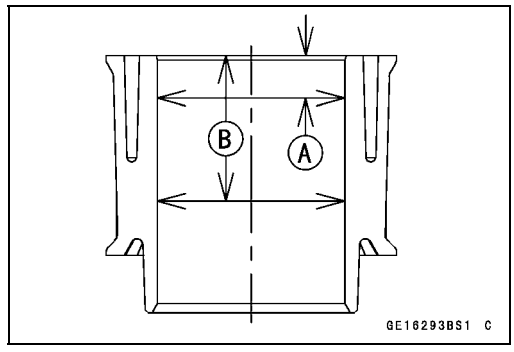
- Install the cylinder (see Cylinder Installation).

Cylinder Wear Inspection

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) shown.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]



Cylinder Inside Diameter

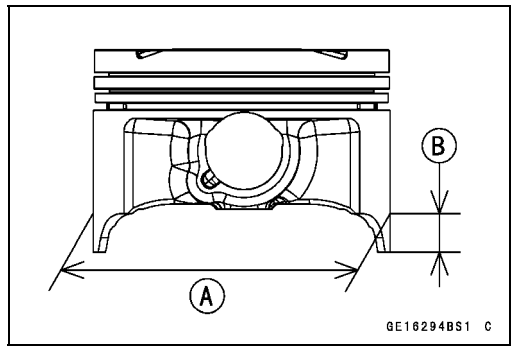
Standard: 61.994 ~ 62.010 mm (2.4407 ~ 2.4413 in.)

Service Limit: 62.09 mm (2.4445 in.)

Piston Wear Inspection

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under service limit, replace the piston.



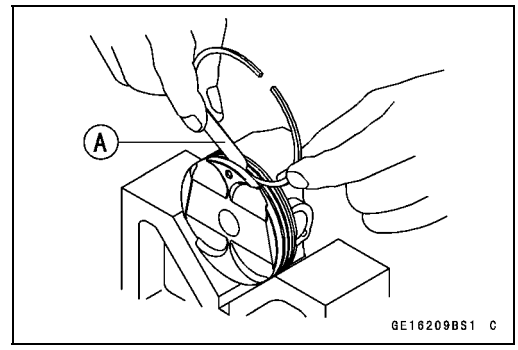
Piston Diameter

Standard: 61.969 ~ 61.984 mm (2.4397 ~ 2.4403 in.)

Service Limit: 61.82 mm (2.4339 in.)

Cylinder, Pistons

Piston Ring, Piston Ring Groove Wear Inspection



- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

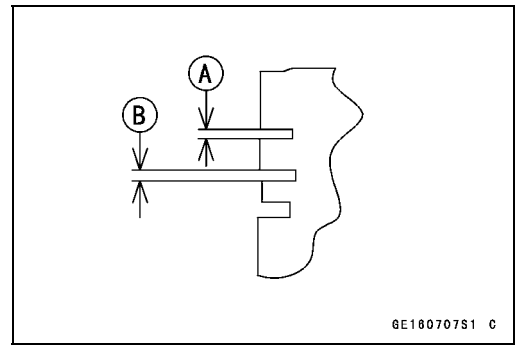
Piston Ring/Groove Clearance
Standard:

Top	**0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**
Second	**0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)**

Service Limit:

Top	**0.17 mm (0.0067 in.)**
Second	**0.16 mm (0.0063 in.)**

Piston Ring Groove Width Inspection



- Measure the piston ring groove width.

○Use a vernier caliper at several points around the piston.

Piston Ring Groove Width
Standard:

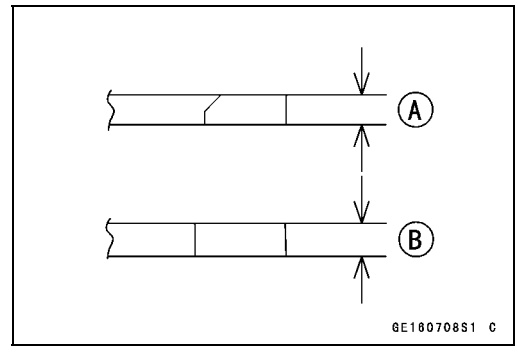
Top [A]	**0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)**
Second [B]	**0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)**

Service Limit:

Top	**0.92 mm (0.0362 in.)**
Second	**0.91 mm (0.0358 in.)**

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Piston Ring Thickness Inspection



- Measure the piston ring thickness.

○Use the micrometer to measure at several points around the ring.

Piston Ring Thickness
Standard:

Top [A]	**0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)**
Second [B]	**0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)**

Service Limit:

Top	**0.70 mm (0.028 in.)**
Second	**0.70 mm (0.028 in.)**

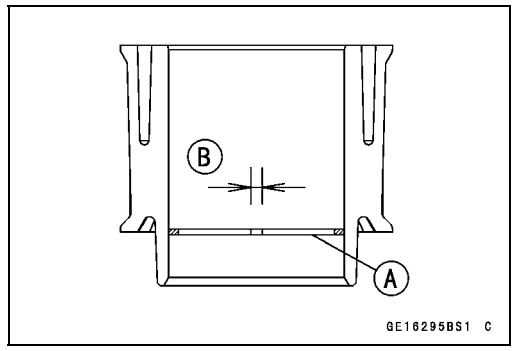
★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Cylinder, Pistons

Piston Ring End Gap Inspection



- Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap [B] between the ends of the ring with a thickness gauge.

Piston Ring End Gap

Standard:

Top	**0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)**
Second	**0.40 ~ 0.55 mm (0.0157 ~ 0.0217 in.)**
Oil	**0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)**

Service Limit:

Top	**0.6 mm (0.024 in.)**
Second	**0.9 mm (0.035 in.)**
Oil	**1.1 mm (0.043 in.)**

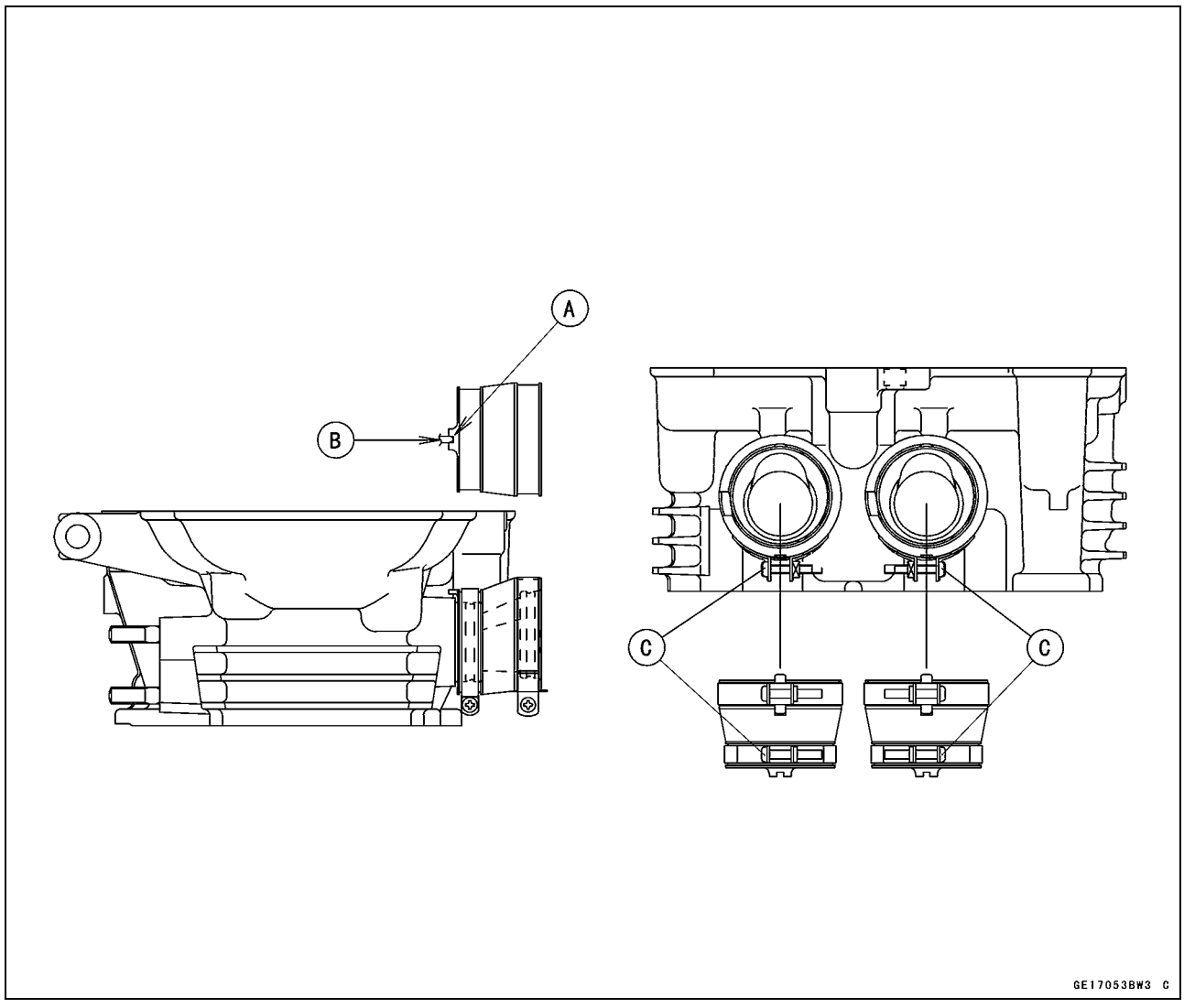
★If the end gap of either ring is greater than the service limit, replace all the rings.

Throttle Body Assy Holder

Throttle Body Assy Holder Installation

- Fit the groove [A] of the throttle body holder to the projection [B] of the cylinder head.
- Install the clamps [C] as shown.
- Tighten:

Torque - Throttle Body Assy Holder Clamp Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)



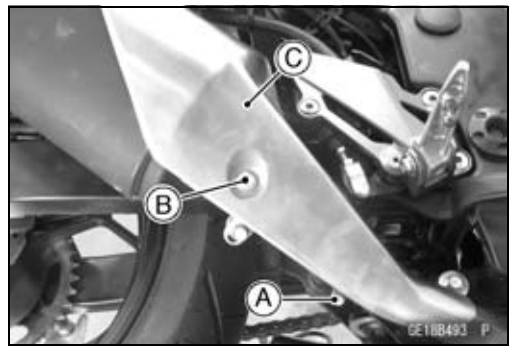
Muffler

⚠ WARNING

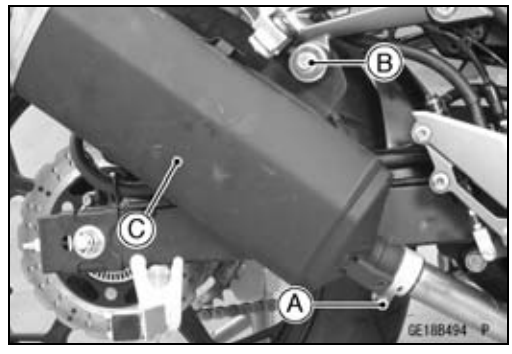
The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.

Muffler Body Removal

- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Muffler Cover Clamp Screw [A] (Loosen)
  Muffler Cover Bolts [B]
  Muffler Cover [C]

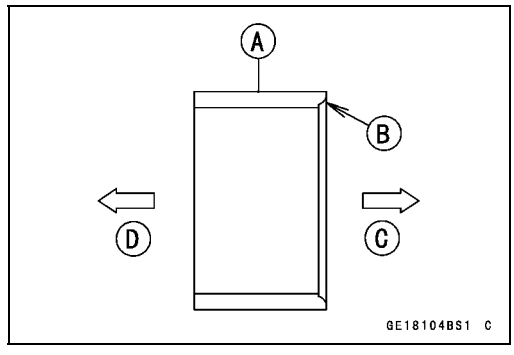


- Remove:
  Clamp Bolt [A] (Loosen)
  Mounting Nut and Bolt [B]
  Muffler Body [C]



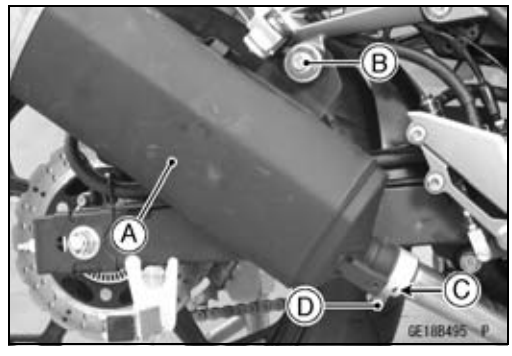
Muffler Body Installation

- Replace the muffler body gasket [A] with a new one.
- Install the muffler body gasket so that its chamfer side [B] faces front [C].
  Rear [D]



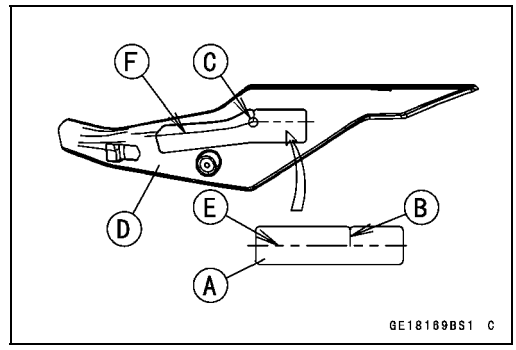
- Install the muffler body [A] and mounting bolt [B].
- Fit the muffler body tooth and the muffler body clamp hole [C].
- Install the muffler body clamp bolt [D].
- Tighten:

Torque - Muffler Body Mounting Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)
Muffler Body Clamp Bolt: 13 N·m (1.3 kgf·m, 115 in·lb)



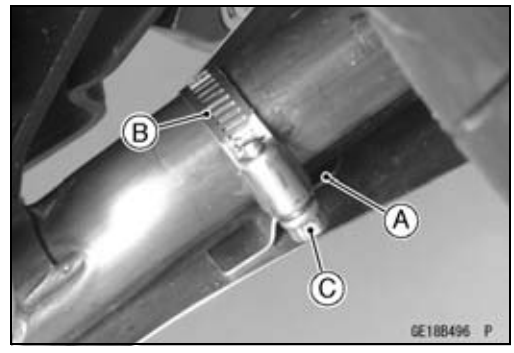
Muffler

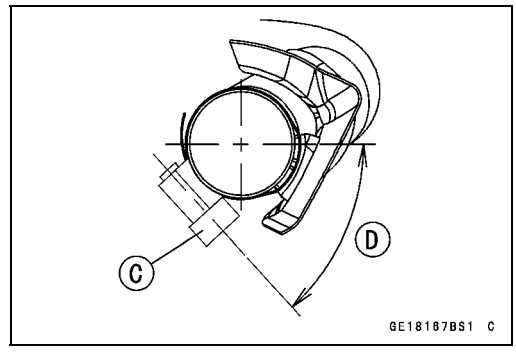
★If the pad [A] was removed, attach the pad as follows:
- Align the end of slit [B] on the pad with the bending point [C] of the edge line on the muffler cover [D].
- Align the center line [E] of the pad with the edge line [F] on the muffler cover to attach the pad.



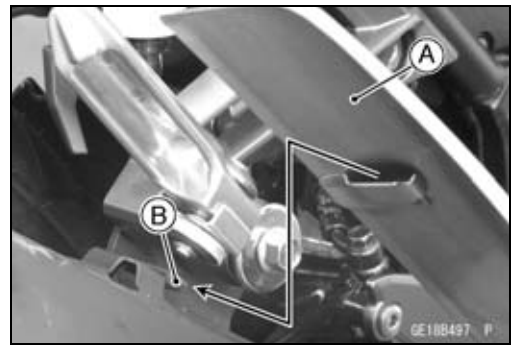
- Insert the claw [A] into the cover clamp [B] and tighten the clamp screw [C] as shown.
  45 ~ 55° [D]

  Torque - Muffler Cover Clamp Screw: 6.9 N·m (0.70 kgf·m, 61 in·lb)





- Insert the muffler cover [A] into the muffler body claw (grommet) [B].

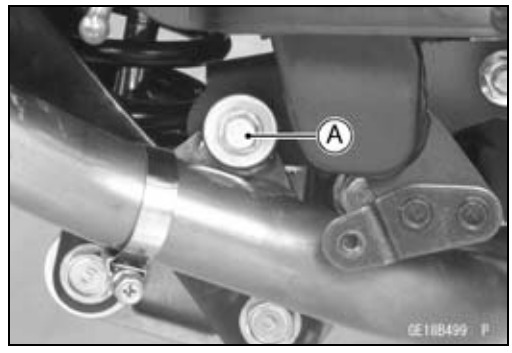


- Install the muffler cover bolt [A] .
- Tighten:

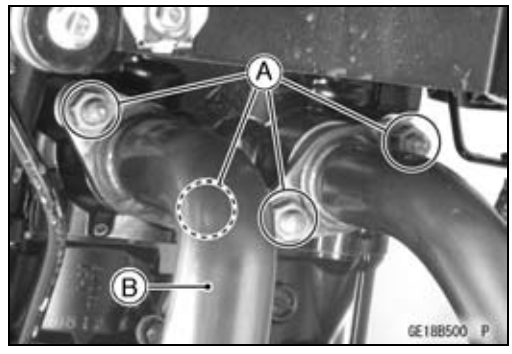
  Torque - Muffler Cover Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and screw.
- Install the removed parts (see appropriate chapters).

Muffler

Exhaust Pipe Removal



- Remove:
  Muffler Body (see Muffler Body Removal)
  Oxygen Sensor (see Oxygen Sensor Removal in the Electrical System chapter)
  Mounting Bolt [A]



- Remove:
  Exhaust Pipe Holder Nuts [A]
  Exhaust Pipe [B]

Exhaust Pipe Installation

- Replace the exhaust pipe gaskets and muffler body gasket with new ones.
- Install the exhaust pipe.
- Tighten:

Torque - Exhaust Pipe Holder Nuts: 12 N·m (1.2 kgf·m, 106 in·lb)
Exhaust Pipe Mounting Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Install the removed parts (see appropriate chapters).

Clutch

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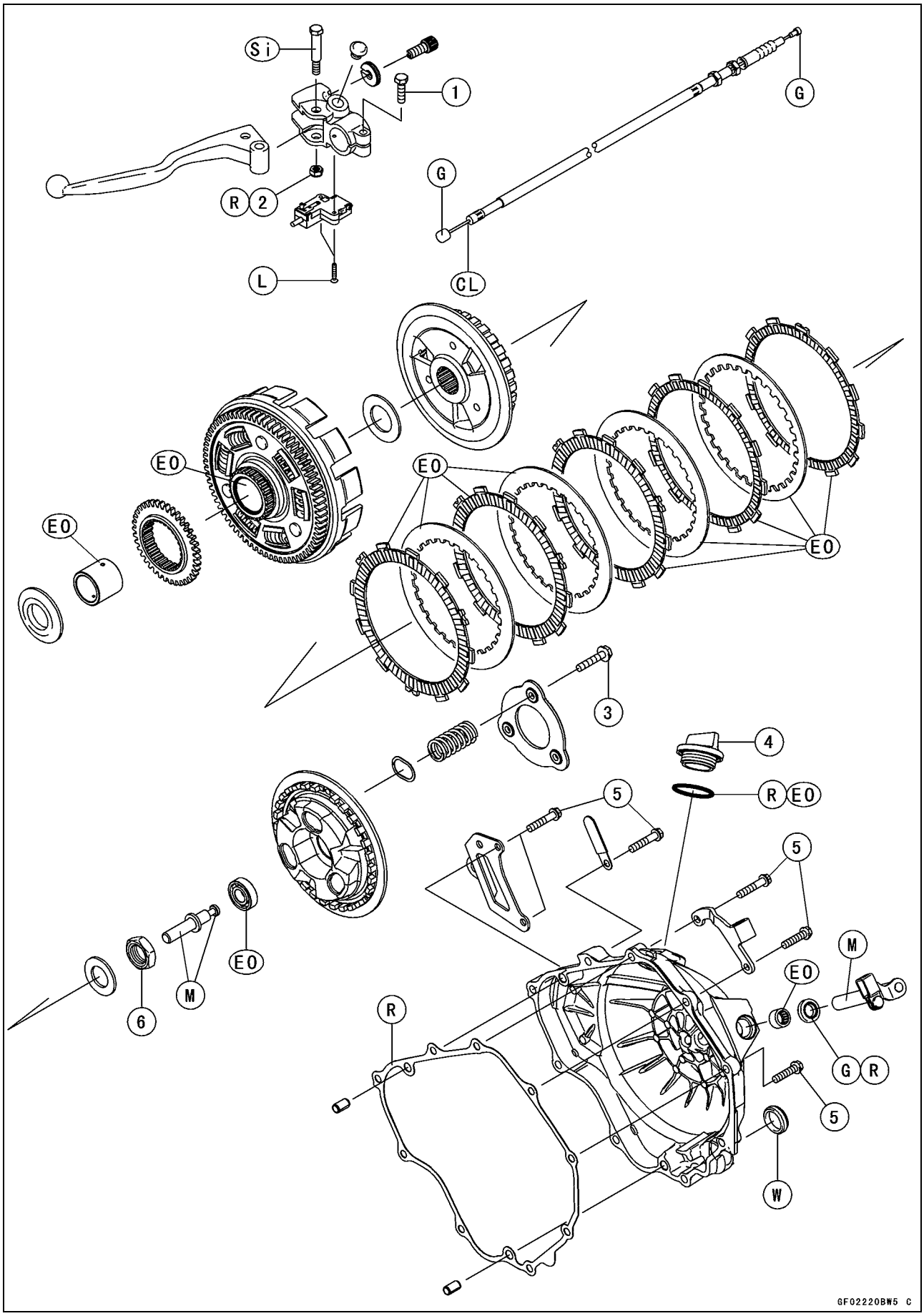
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Clamp Bolt	8.8	0.90	78 in·lb	
2	Clutch Lever Pivot Bolt Locknut	1.6	0.16	14 in·lb	R
3	Clutch Stopper Bolts	8.83	0.900	78.2 in·lb	
4	Oil Filler Plug	–	–	–	Hand-Tighten
5	Clutch Cover Bolts	9.8	1.0	87 in·lb	
6	Clutch Hub Nut	132	13.5	97.4	

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
Si: Apply silicone grease.
W: Apply water.

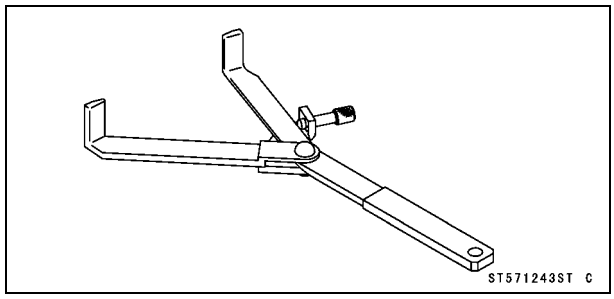
6-4 CLUTCH

Specifications

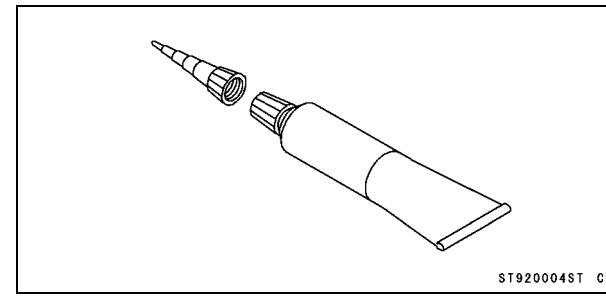
Item	Standard	Service Limit
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch		
Friction Plate Thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.6 mm (0.10 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.012 in.)
Clutch Spring Free Length	42.0 mm (1.65 in.)	40.2 mm (1.58 in.)

Special Tool and Sealant

Clutch Holder:
57001-1243



Liquid Gasket, TB1211F:
92104-0004



Clutch Lever and Cable

Clutch Lever Free Play Inspection

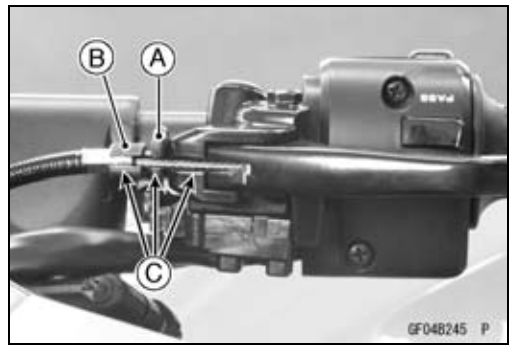
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

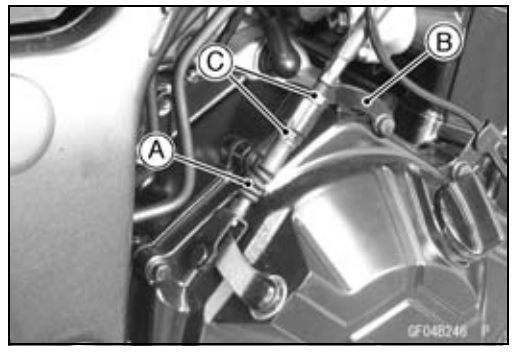
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Cable Removal

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Loosen the locknut [A] at the clutch lever, and screw in the adjuster [B].
- Line up the slots [C] in the clutch lever, locknut and adjuster, and then free the cable from the lever.



- Slide the dust cover [A] at the clutch cable lower end out of place.
- Remove the clutch cable lower from the cable holder [B] loosening the locknuts [C].
- Free the clutch inner cable tip from the clutch release lever.
- Pull the clutch cable out of the frame.



Clutch Cable Installation

- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).

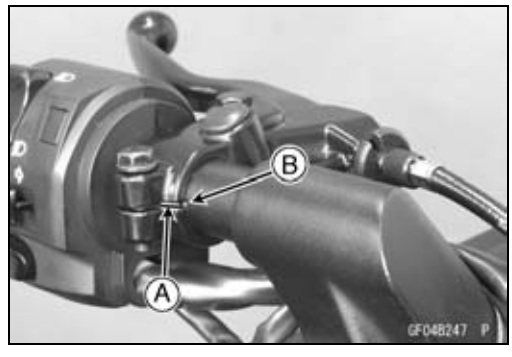
Clutch Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Clutch Lever Installation

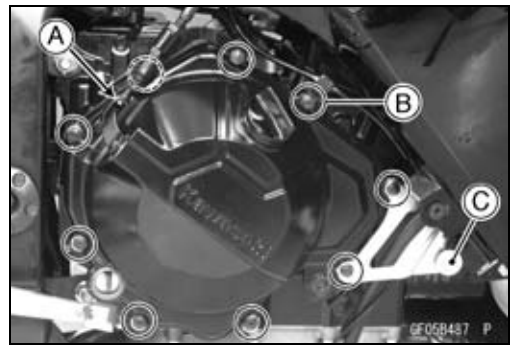
- Install the clutch lever so that the mating surface [A] of the clutch lever is aligned with the punch mark [B].
- Tighten:

Torque - Clutch Lever Clamp Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

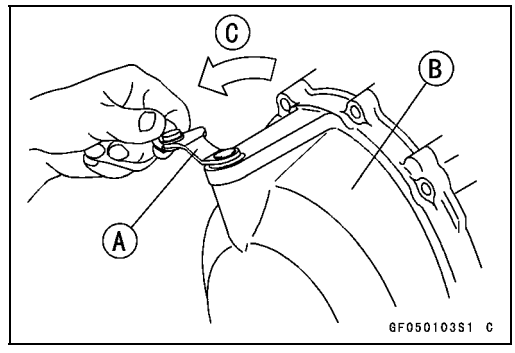


Clutch Cover

Clutch Cover Removal

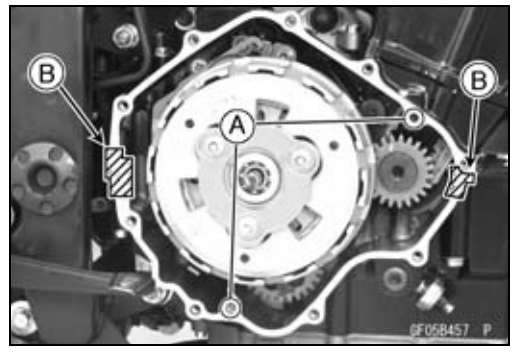


- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Clutch Cable Lower End [A]
  Clutch Cover Bolts [B]
  Bolt [C]



- Turn the release lever [A] toward the rear as shown in the figure, and remove the clutch cover [B].
  About 90° [C]

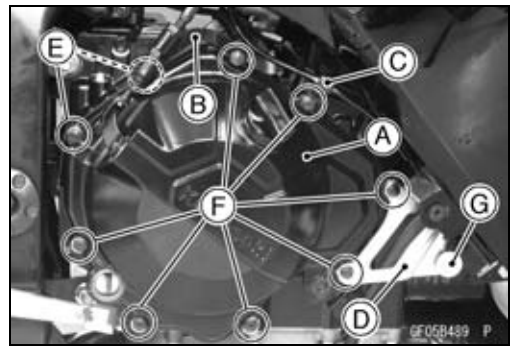
Clutch Cover Installation



- Be sure to dowel pins [A].
- Clean off any oil or dirt and apply liquid gasket to the area [B] where the mating surface of the crankcase touches the clutch cover gasket.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Replace the clutch cover gasket with a new one and install it.



- Install:
  Clutch Cover [A]
  Clutch Cable Bracket [B]
  Clamp [C]
  Bracket [D]
- Tighten the clutch cover bolts [E] (L = 25 mm) and [F] (L= 30 mm).

  Torque - Clutch Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Tighten the bolt [G].
- Install the removed parts (see appropriate chapters).

Release Shaft Removal

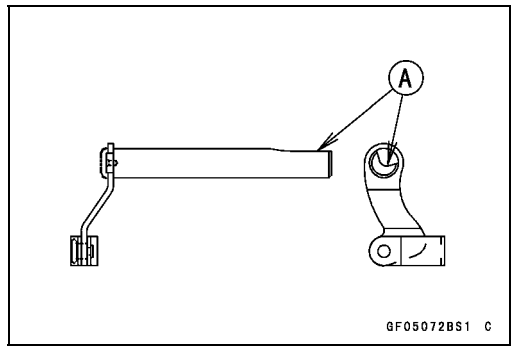
NOTICE

Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

- Remove the clutch cover (see Clutch Cover Removal).
- Pull the lever and shaft assembly straight out of the clutch cover.

Clutch Cover

Release Shaft Installation

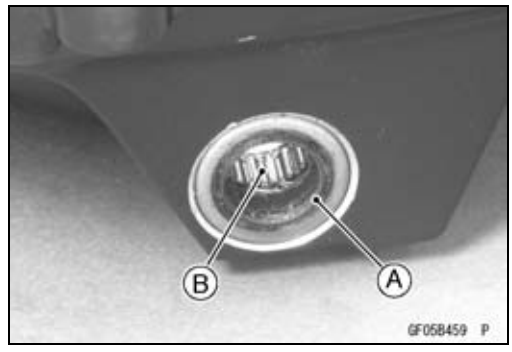


- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearing in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Insert the release shaft straight into the upper hole of the clutch cover.

NOTICE

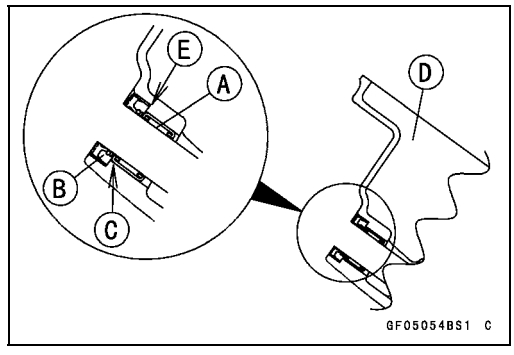
When inserting the release shaft, be careful not to remove the spring of the oil seal.

Clutch Cover Disassembly



- Remove:
  Oil Seal [A]
  Needle Bearing [B]
  Oil Level Inspection Window

Clutch Cover Assembly



- Replace the needle bearing and oil seal with new ones.

NOTE

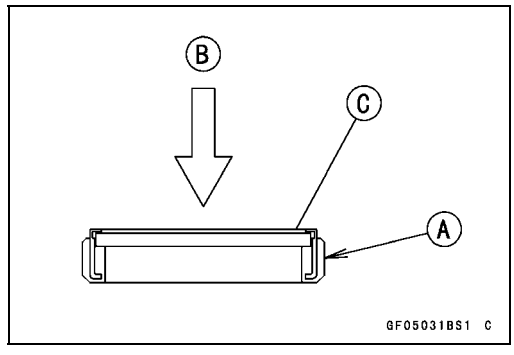
○*Install the needle bearing so that the manufacture's mark face out.*

- Install the needle bearing [A] and oil seal [B] position as shown.

○Press the needle bearing so that the bearing surface [C] is flush with the housing end of clutch cover [D].

○Press the oil seal until the bottom [E].

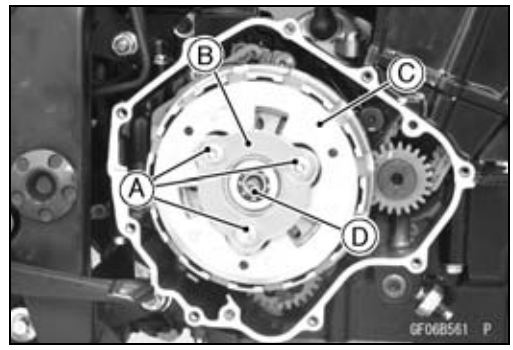
- Apply grease to the oil seal lips.



- Apply water to the rubber of the oil level inspection window [A] and press [B] it so that the ring [C] faces outside.

Clutch

Clutch Removal



● Remove:
Clutch Cover (see Clutch Cover Removal)
Clutch Stopper Bolts [A]

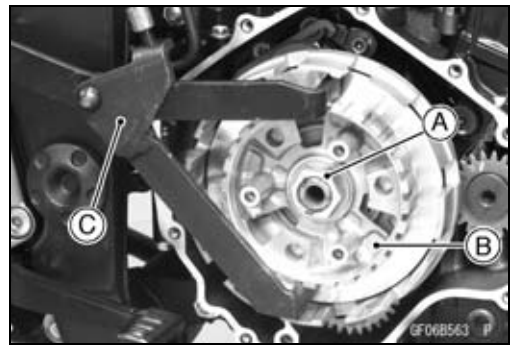
○Loosen the clutch stopper bolts evenly with little by little to prevent tilting the clutch stopper plate.

NOTICE

Do not loosen the one or two clutch stopper plate bolt at once to prevent clutch stopper plate warpage by the spring force.

● Remove:
Clutch Stopper Plate [B]
Clutch Springs
Clutch Pressure Plate [C] (with Bearing and Pusher [D])

● Remove:
Spring Seats [A]



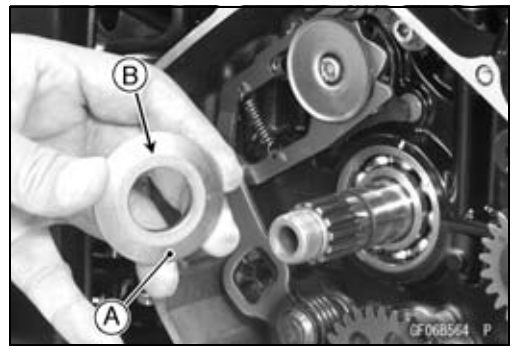
● Remove:
Friction Plates and Steel Plates
Clutch Hub Nut [A]

○Holding the clutch hub [B], remove the nut and washer.

Special Tool - Clutch Holder [C]: 57001-1243

● Remove:
Clutch Hub
Spacer
Bushing
Clutch Housing
Thrust Spacer

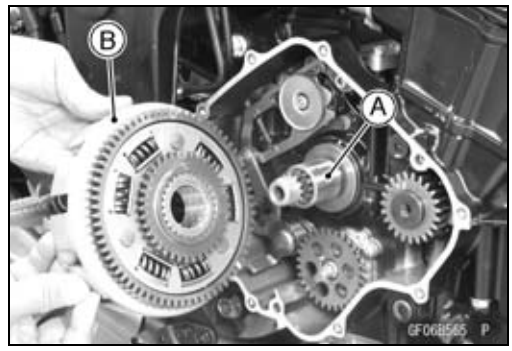
Clutch Installation



● Install the thrust spacer [A] so that the chamfer side [B] faces inward.

Clutch

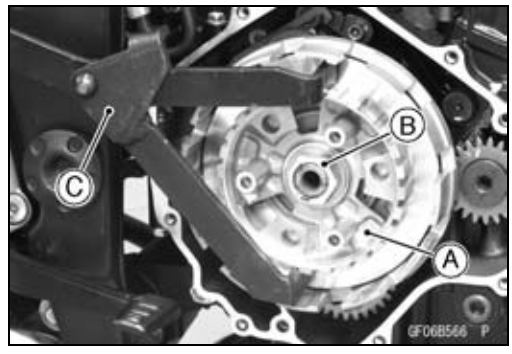
● Install the bushing [A], clutch housing [B], spacer, clutch hub, washer and clutch hub nut.



○Holding the clutch hub [A], tighten the clutch hub nut [B].

Special Tool - Clutch Holder [C]: 57001-1243

Torque - Clutch Hub Nut: 132 N·m (13.5 kgf·m, 97.4 ft·lb)



● Make sure the friction plates [A] [B] and steel plates [C] [D] in relations to the differences and installation positions.

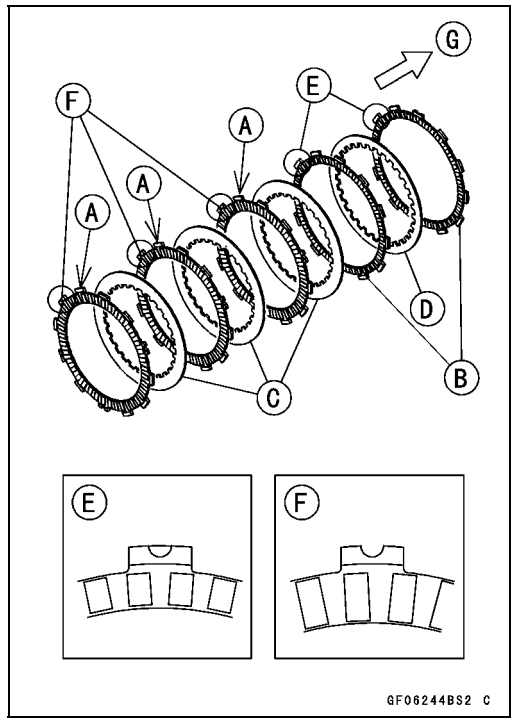
○The friction plates [B] are no cutout [E] on the tangs and the friction plates [A] have the cutout [F] on the tangs. The steel plate [D] has the larger inner diameter than others.

NOTICE

If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

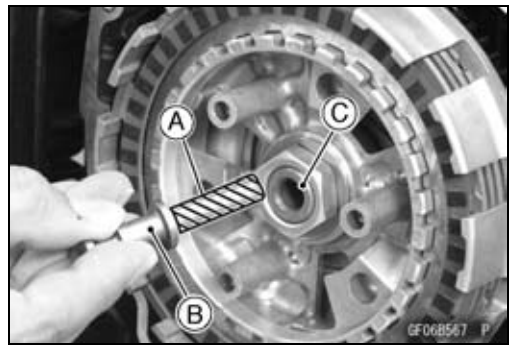
● Install the three friction plates [A] and three steel plates [C] alternately, and then install the one friction plate [B] to the outside [G] position as shown.

○The one friction plate [B] and steel plate [D] positioned to the outside should be install later together with the clutch pressure plate.



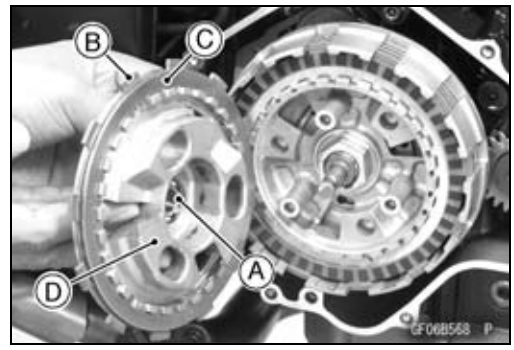
● Apply molybdenum disulfide grease to the pusher end [A].

● Install the pusher [B] into the drive shaft [C].

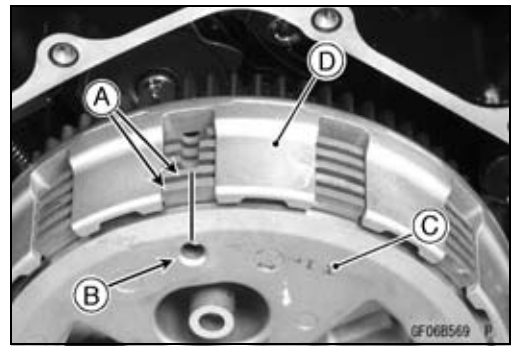


Clutch

- Apply engine oil to the sliding surfaces of the bearing [A].
- Put the friction plate [B] (no cutout) and steel plate [C] (larger inner diameter) on the clutch pressure plate [D], and install them.

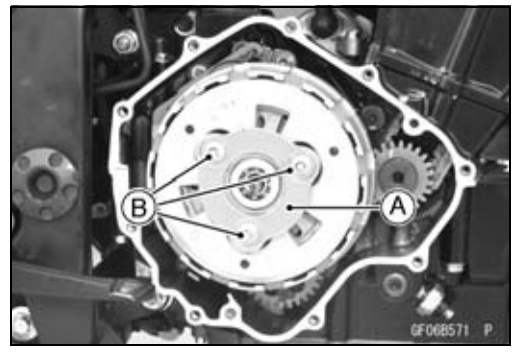


○Align the tangs [A] on the friction plates (no cutout) with hole [B] on the clutch pressure plate [C] to install them into the clutch housing [D].



- Install:
  Spring Seats [A]

- Install:
  Clutch Springs
  Clutch Stopper Plate [A]
  Clutch Stopper Bolts [B]
- Tighten the clutch stopper plate bolts evenly with little by little to prevent tilting the clutch stopper plate.



NOTICE

Do not tighten the one or two clutch stopper plate bolt at once to prevent clutch stopper plate warp age by the spring force.

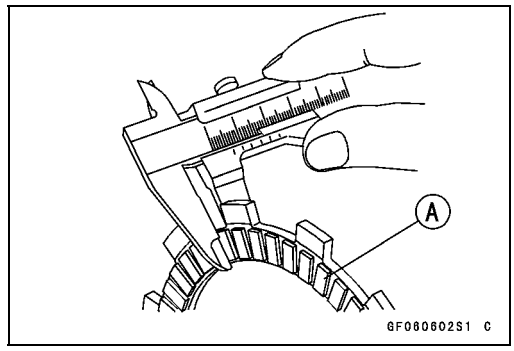
- Tighten:

  Torque - Clutch Stopper Bolts: 8.83 N·m (0.900 kgf·m, 78.2 in·lb)

- Install the clutch cover (see Clutch Cover Installation).

Clutch

Clutch Plate Wear and Damage Inspection



- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

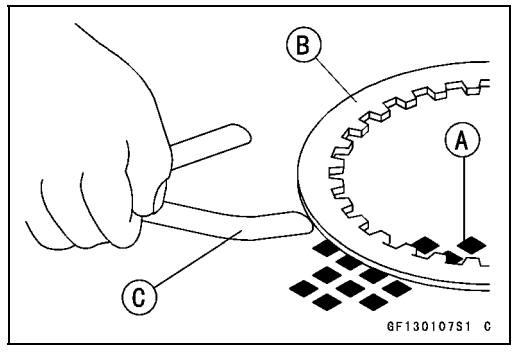
★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

Friction Plate Thickness

Standard: **2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)**

Service Limit: **2.6 mm (0.10 in.)**

Clutch Plate Warp Inspection



- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

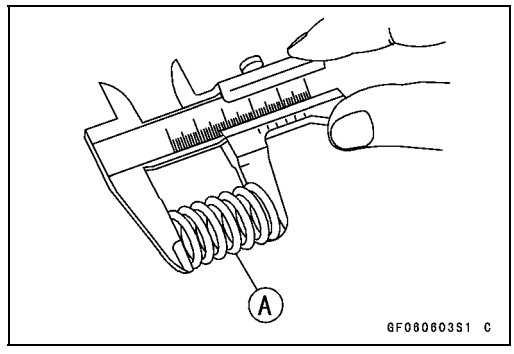
★If any plate is warped over the service limit, replace it with a new one.

Friction and Steel Plate Warp

Standard: **0.15 mm (0.0059 in.) or less**

Service Limit: **0.3 mm (0.012 in.)**

Clutch Spring Free Length Inspection



- Measure the free length of the clutch springs [A].

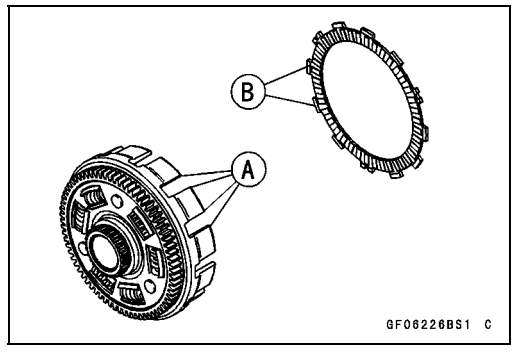
★If any spring is shorter than the service limit, it must be replaced.

Clutch Spring Free Length

Standard: **42.0 mm (1.65 in.)**

Service Limit: **40.2 mm (1.58 in.)**

Clutch Housing Finger Inspection



- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit.

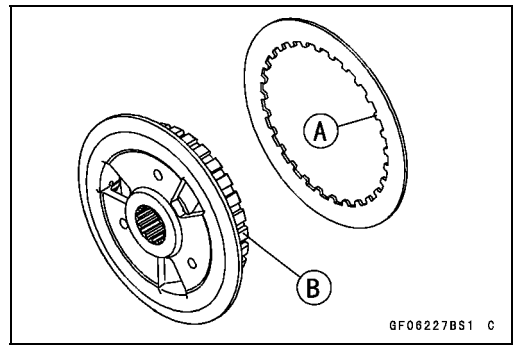
★If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.

Clutch

Clutch Housing Spline Inspection

- Visually inspect where the teeth [A] on the steel plates wear against the clutch hub splines [B].

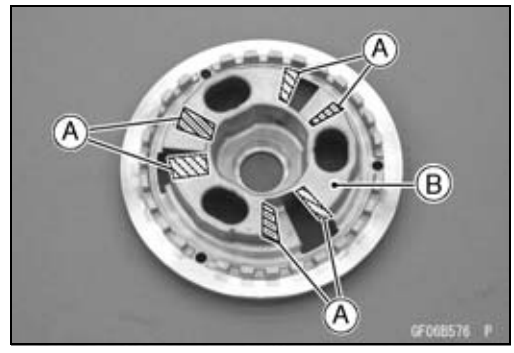
★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.

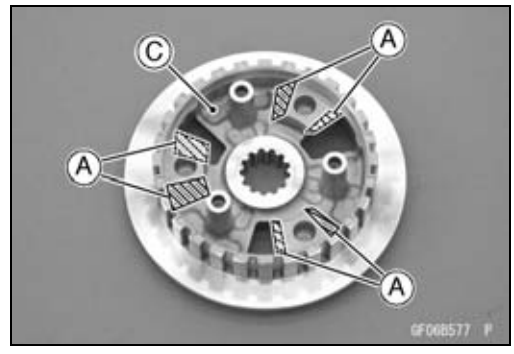


Clutch Pressure Plate and Clutch Hub Inspection

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.

★If the contact areas are damaged replace them with new ones.





Engine Lubrication System

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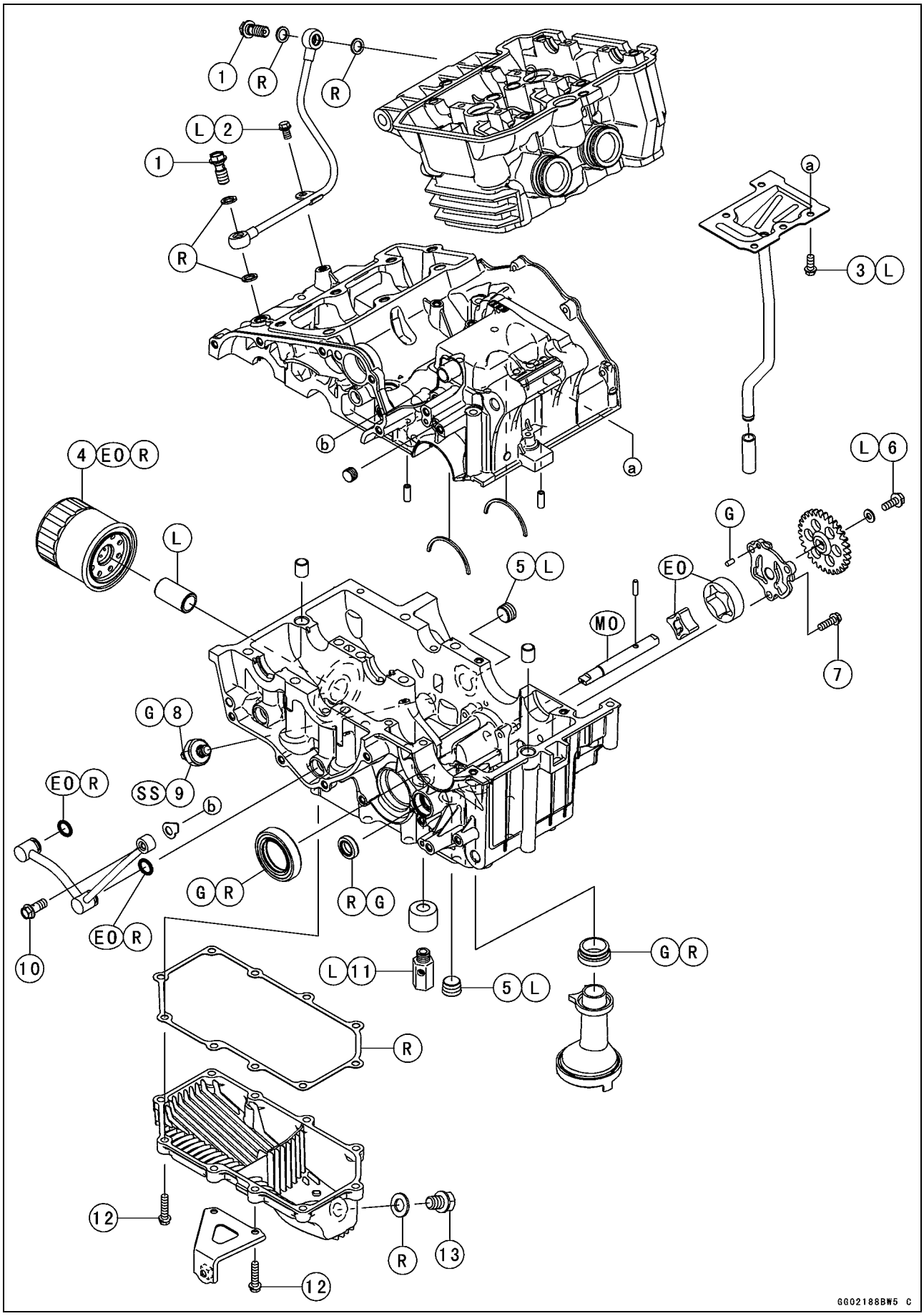
Exploded View

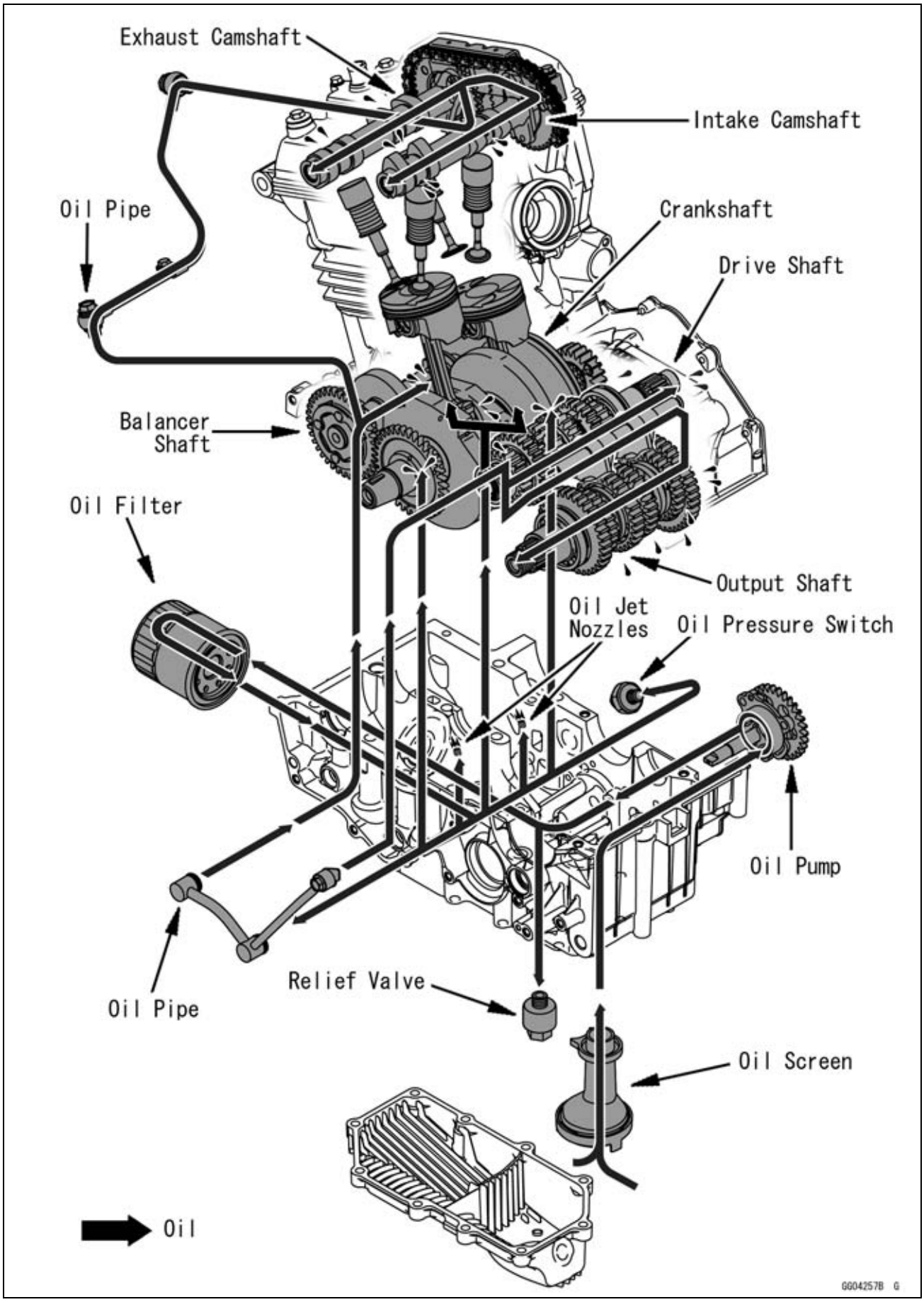


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Pipe Banjo Bolts (Outside)	19.6	2.00	14.5	
2	Oil Pipe Bolt	9.8	1.0	87 in·lb	L
3	Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
4	Oil Filter	17.5	1.78	12.9	EO, R
5	Crankcase Oil Passage Plugs	20	2.0	15	L
6	Spur Gear Mounting Bolt	9.8	1.0	87 in·lb	L
7	Oil Pump Mounting Bolts	9.8	1.0	87 in·lb	
8	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
9	Oil Pressure Switch	15	1.5	11	SS
10	Oil Pipe Banjo Bolt (Inside)	12	1.2	106 in·lb	
11	Oil Pressure Relief Valve	15	1.5	11	L
12	Oil Pan Bolts	9.8	1.0	87 in·lb	
13	Engine Oil Drain Bolt	19.6	2.00	14.5	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide grease oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
SS: Apply silicone sealant.

Engine Oil Flow Chart

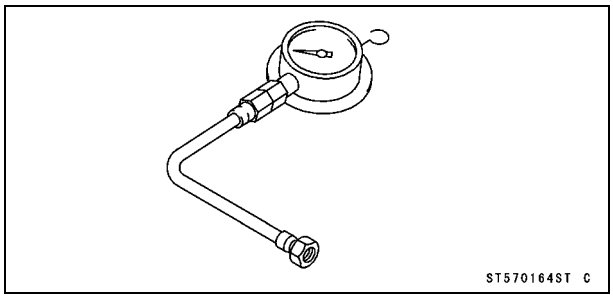


Specifications

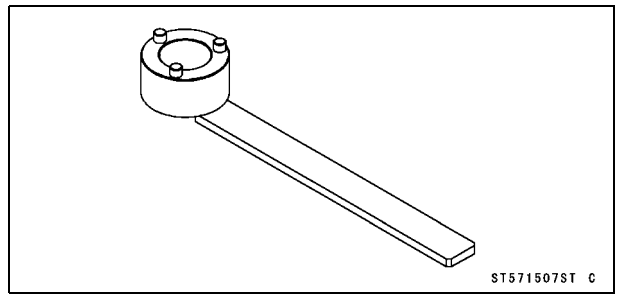
Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.0 L (2.1 US qt) (when filter is not removed) 2.2 L (2.3 US qt) (when filter is removed) 2.4 L (2.5 US qt) (when engine is completely dry)
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	98 ~ 147 kPa (1.0 ~ 1.5 kgf/cm², 14 ~ 21 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealant

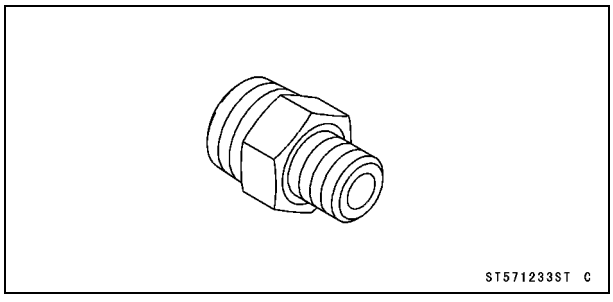
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



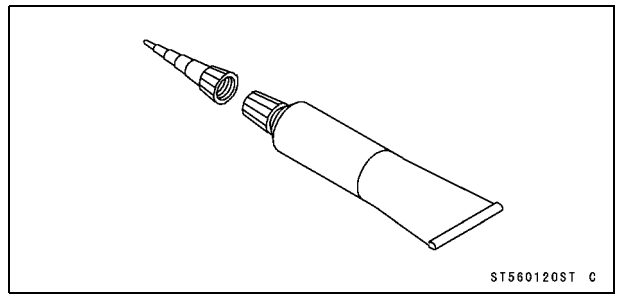
Clutch Holder 1:
57001-1507



Oil Pressure Gauge Adapter, PT3/8:
57001-1233



Liquid Gasket, TB1211:
56019-120



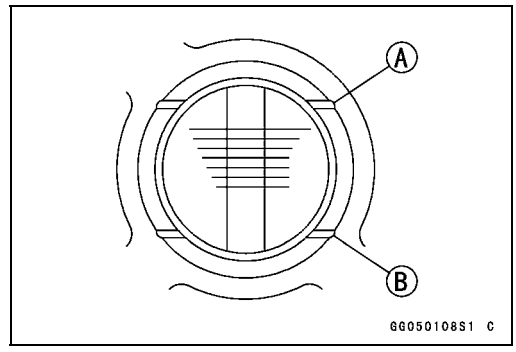
Engine Oil and Oil Filter

⚠ WARNING

Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

● Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window.



NOTE

○*Situate the motorcycle so that it is perpendicular to the ground.*

○*If the motorcycle has just been used, wait several minutes for all the oil to drain down.*

○*If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.
If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning indicator light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

○*If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

Engine Oil Change

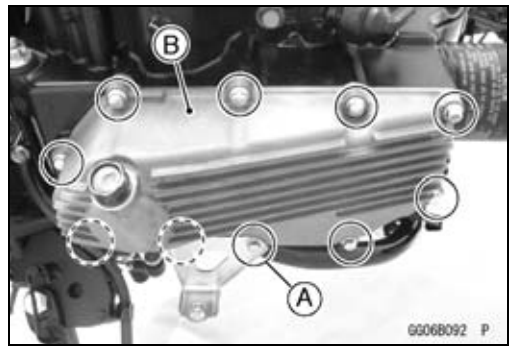
● Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Replacement

● Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

Engine Oil and Oil Filter

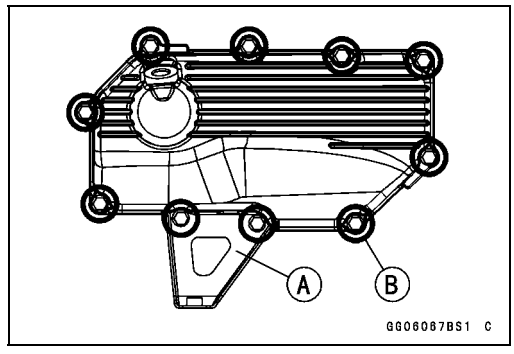
Oil Pan Removal



- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Oil Pan Bolts [A] with Bracket
  Oil Pan [B]
  Gasket
- Remove the following parts if necessary.
  Oil Screen (see Oil Screen Removal)
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal)

Oil Pan Installation

- Install the following parts if removed.
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Installation)
  Oil Screen (see Oil Screen Installation)

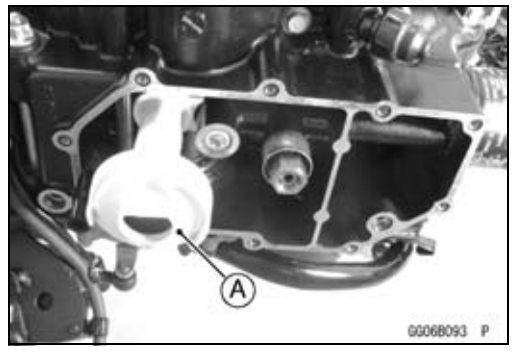


- Replace the oil pan gasket with a new one.
- Install the brackets [A] as shown in the figure.
- Tighten:

Torque - Oil Pan Bolts [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

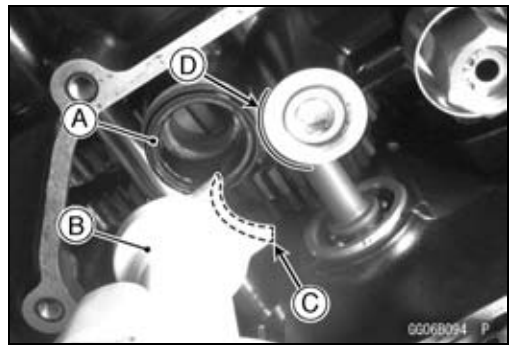
- Install the removed parts (see appropriate chapters).

Oil Screen Removal



- Remove:
  Oil Pan (see Oil Pan Removal)
  Oil Screen [A]

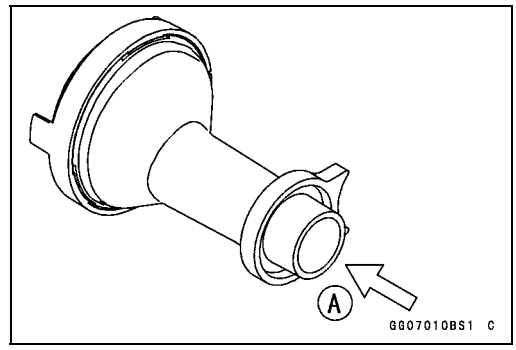
Oil Screen Installation



- Clean the oil screen (see Oil Screen Cleaning).
- Replace the O-ring [A] with a new one, and install it.
- Apply grease to the O-ring.
- Install the oil screen [B] so that its guide portion [C] fits the crankcase rib [D].

Engine Oil and Oil Filter

Oil Screen Cleaning



- Remove the oil screen (see Oil Screen Removal).
- Clean the oil screen with a high flash-point solvent and remove the particles stuck.
- Blow away the particles by applying compressed air [A] from the inside to the outside (from the clean side to the dirty side).

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the screen.

NOTE

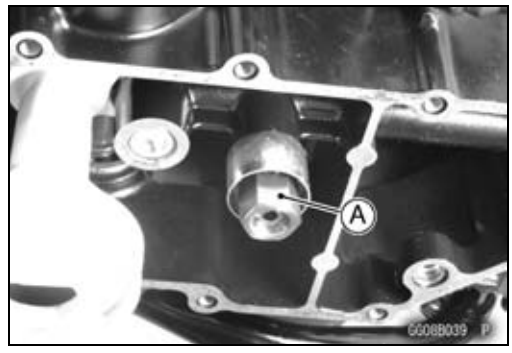
○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

- Check the screens carefully for any damage.

★If the screen is damaged, replace the oil screen.

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal



- Remove:
  Oil Pan (see Oil Pan Removal)
  Oil Pressure Relief Valve [A]

Oil Pressure Relief Valve Installation

- Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

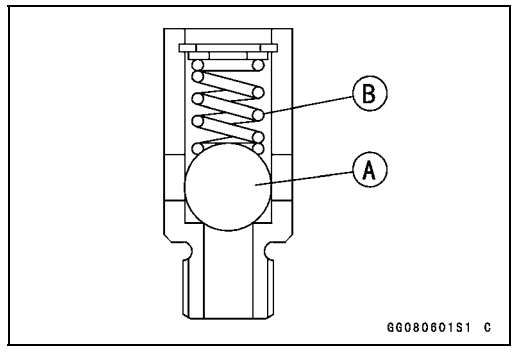
NOTICE

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the removed parts (see appropriate chapters).

Oil Pressure Relief Valve Inspection



- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

○*Do not try to disassemble the pressure relief valve. The pressure relief valve inspection should be checked in its assembled condition.*

★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the relief valve in a well-ventilated area, and take care that there is no spark or flame anywhere near the working areas. Do not use gasoline or low flash-point solvents to clean the relief valve.

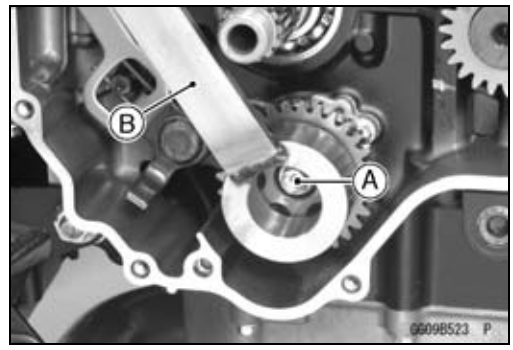
★If any problem does not improve, replace the pressure relief valve as an assembly.

Oil Pump

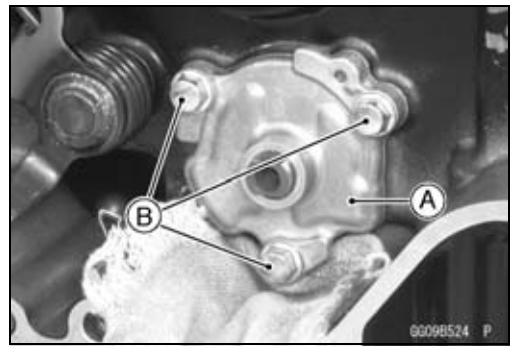
Oil Pump Removal

- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
  Spur Gear Mounting Bolt [A]

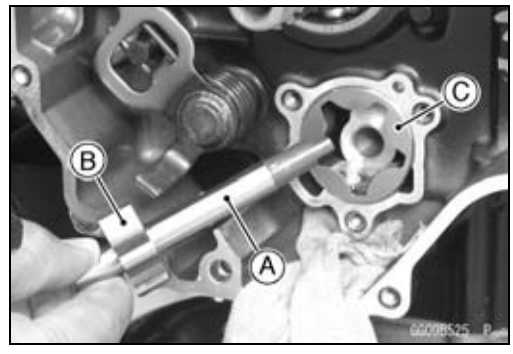
Special Tool - Clutch Holder 1 [B]: 57001-1507



- Place a clean cloth under the oil pump cover [A].
- Remove:
  Oil Pump Mounting Bolts [B]
  Oil Pump Cover

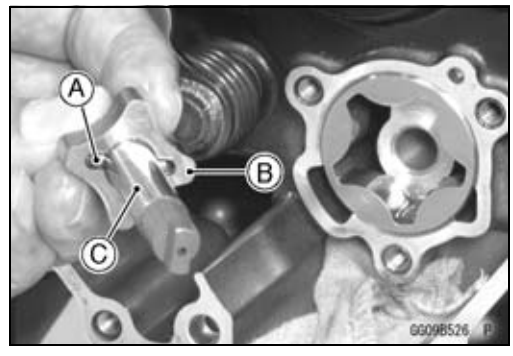


- Remove:
  Oil Pump Shaft [A] with Inner Rotor [B]
  Outer Rotor [C]

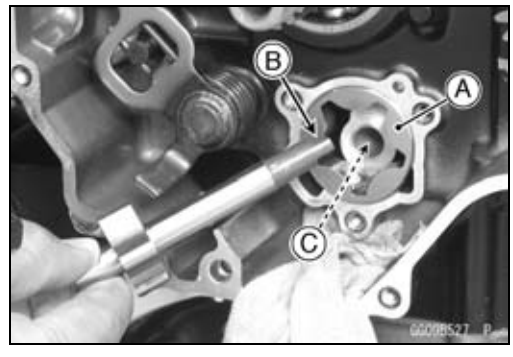


Oil Pump Installation

- Assemble the pin [A] and rotor [B] to the oil pump shaft [C], aligning the pin with the grooves on the rotor.
- Apply molybdenum disulfide oil solution to the sliding surfaces of the oil pump shaft.

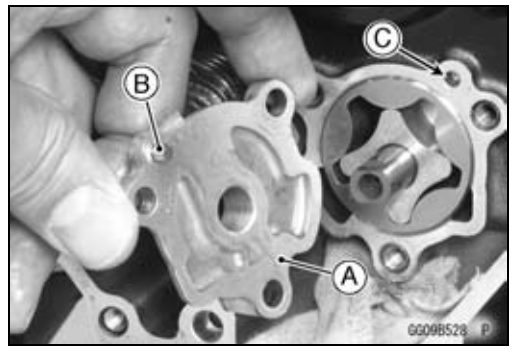


- Install the outer rotor [A] into the crankcase.
- Turn the oil pump shaft so that the projection [B] in its shaft fits into the slot [C] of the water pump shaft.



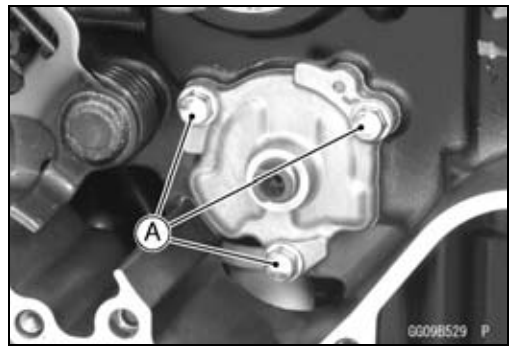
Oil Pump

- Install the oil pump cover [A] so that the dowel pin [B] fits into the hole [C] of the crankcase.

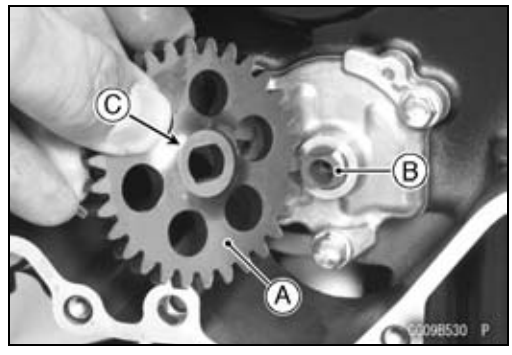


- Tighten:

Torque - Oil Pump Mounting Bolts [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



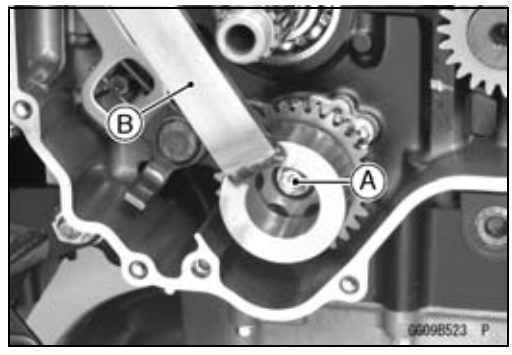
- Install the spur gear [A] onto the oil pump shaft [B] with its projecting side [C] facing to the oil pump.



- Apply a non-permanent locking agent to the threads of the spur gear mounting bolt [A].
- Tighten the spur gear mounting bolt.

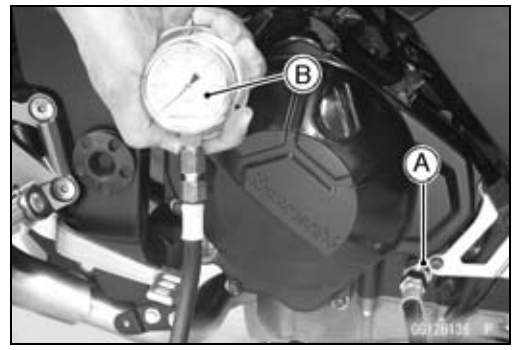
Special Tool - Clutch Holder 1 [B]: 57001-1507

Torque - Spur Gear Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Oil Pressure Measurement

Oil Pressure Measurement



- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the crankcase oil passage plug, and attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT3/8: 57001 -1233

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

★If the reading is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

★If the reading is much higher than the standard, check the oil passages for clogging.

Oil Pressure
Standard: 98 ~ 147 kPa (1.0 ~ 1.5 kgf/cm², 14 ~ 21 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

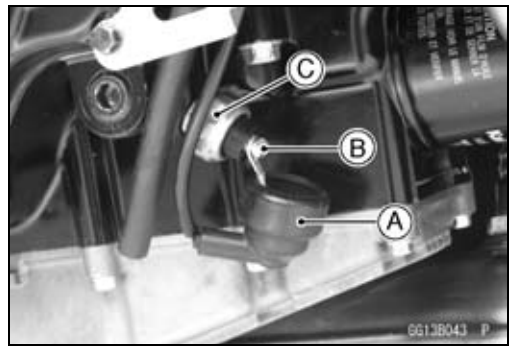
- Apply a non-permanent locking agent to the crankcase oil passage plug, and install it.
- Tighten:

Torque - Crankcase Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Install the right lower fairing (see Lower Fairing Installation in the Frame chapter).

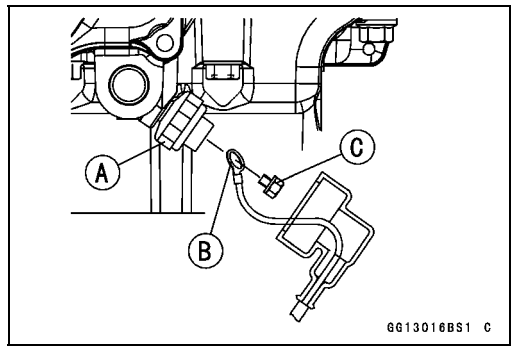
Oil Pressure Switch

Oil Pressure Switch Removal



- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Switch Cover [A]
  Switch Terminal Bolt [B]
  Oil Pressure Switch [C]

Oil Pressure Switch Installation



- Clean off any oil or dirt and apply silicone sealant to the threads of the oil pressure switch [A] and tighten it.

  Sealant - Liquid Gasket, TB1211: 56019-120

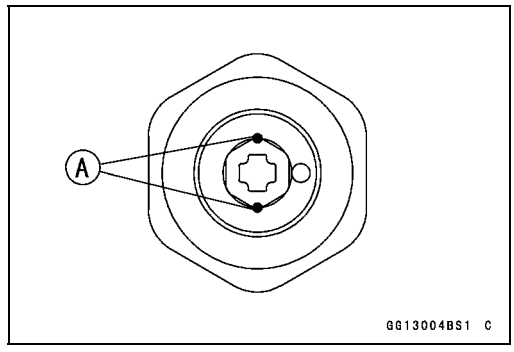
  Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply grease to the both sides of the switch lead terminal [B].
- Connect the switch lead terminal bolt [C] to the switch terminal.
- Tighten:

  Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

NOTE

○*Apply a small amount of grease to the terminal so that grease should not close two breather holes [A] for switch diaphragm.*



- Install:
  Switch Cover
  Right Lower Fairing (see Lower Fairing Installation in the Frame chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).

Engine Removal/Installation

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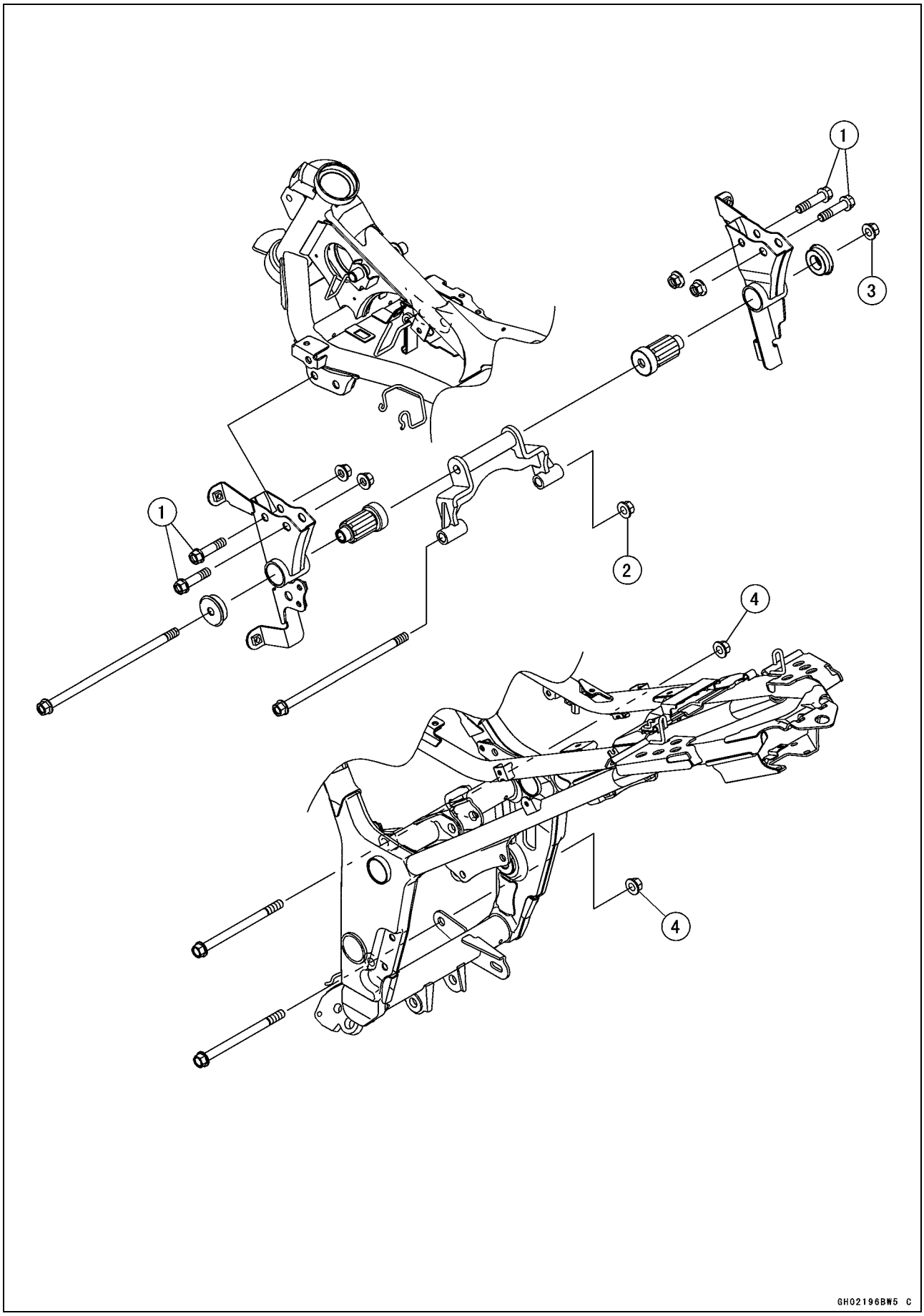
Exploded View

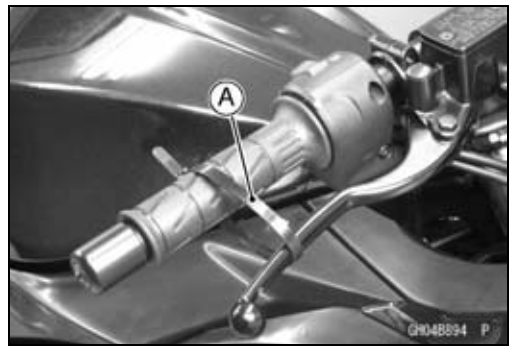


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Upper Engine Mounting Bolts	69	7.0	51	
2	Front Lower Engine Mounting Nut	69	7.0	51	
3	Front Middle Engine Mounting Nut	44	4.5	32	
4	Rear Engine Mounting Nuts	69	7.0	51	

Engine Removal/Installation

Engine Removal



- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].

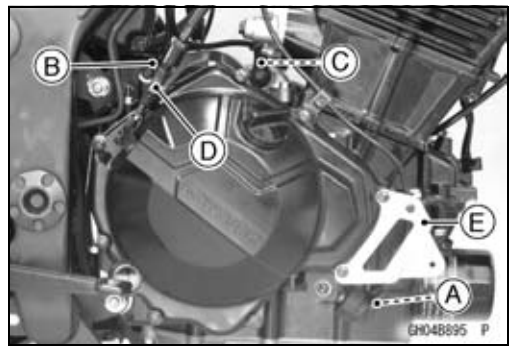
⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

NOTICE

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

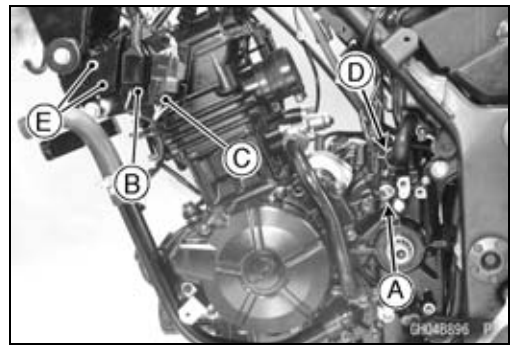
- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Shift Lever (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)



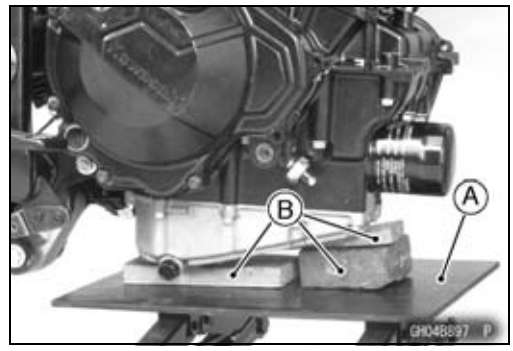
- Disconnect:
  Oil Pressure Switch Lead Terminal [A]
  Engine Ground Cable Terminal [B]
  Starter Motor Cable Terminal [C]
- Remove:
  Clutch Cable Lower End [D] (see Clutch Cable Removal in the Clutch chapter)
  Bracket [E]

Engine Removal/Installation

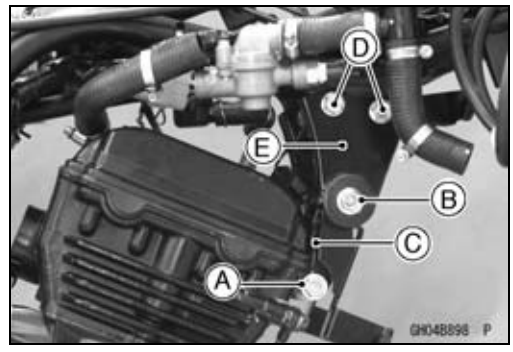
● Disconnect:
Neutral Switch Lead Terminal [A]
Crankshaft Sensor Lead Connector [B]
Alternator Lead Connector [C]
● Remove:
Breather Hose [D]
Connector Mounting Bracket Bolts [E]



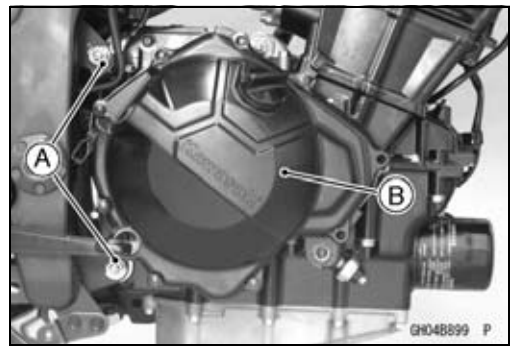
● Support the engine with a suitable stand [A].
○Put planks [B] onto the suitable stand for engine balance.



● Remove:
Front Lower Engine Mounting Nut [A] and Bolt
Front Middle Engine Mounting Nut [B] and Bolt
Front Lower Engine Mounting Bracket [C]
Front Upper Engine Mounting Nuts and Bolts [D] (Both Sides)
Front Upper Engine Mounting Brackets [E] (Both Sides)
Side Dampers (Both Sides)



● Remove:
Rear Engine Mounting Nuts [A] and Bolts
Engine [B]

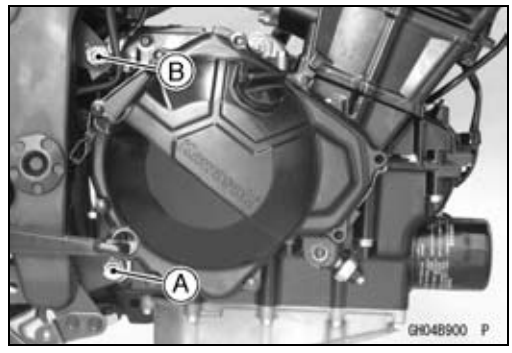


Engine Installation

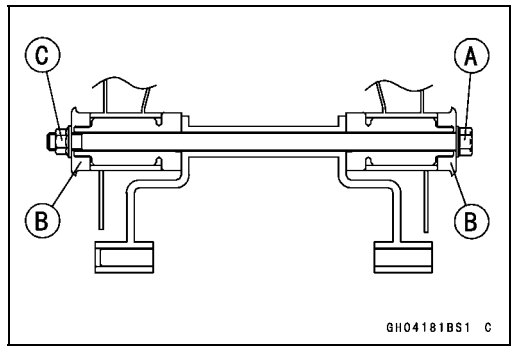
● Support the engine with a suitable stand.
○Put planks onto the suitable stand for engine balance.

Engine Removal/Installation

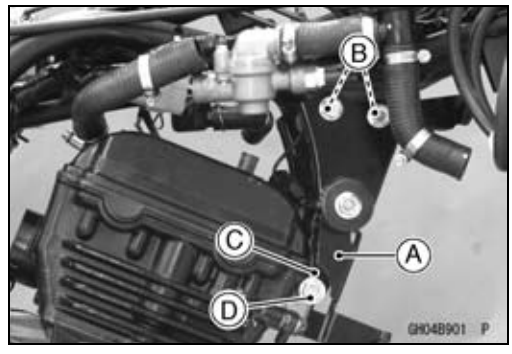
- Insert the rear lower engine mounting bolt [A] first from left side while supporting the engine. Then insert the rear upper engine mounting bolt [B] from left side, and tighten the nuts temporarily.



- Install the following temporarily:
  Front Middle Engine Mounting Bolt [A]
  Side Dampers [B]
  Front Middle Engine Mounting Nut [C]

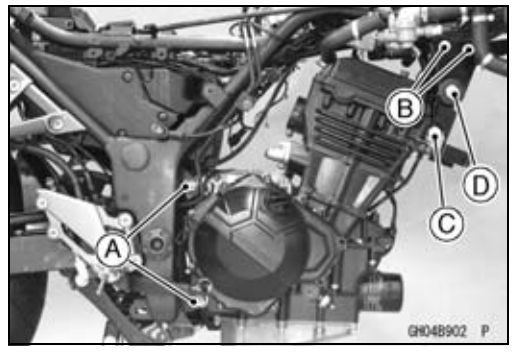


- Install the front upper engine mounting bracket [A] (Both Sides) and tighten the nuts [B] temporarily.
- Install the front lower engine mounting bracket [C] and tighten the nut [D] temporarily.



- By the following specified sequence, tighten the bolts.

Torque - Rear Engine Mounting Nuts [A]: 69 N·m (7.0 kgf·m, 51 ft·lb)
Front Upper Engine Mounting Bolts [B]: 69 N·m (7.0 kgf·m, 51 ft·lb)
Front Lower Engine Mounting Nut [C]: 69 N·m (7.0 kgf·m, 51 ft·lb)
Front Middle Engine Mounting Nut [D]: 44 N·m (4.5 kgf·m, 32 ft·lb)



- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
  Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)
  Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

Crankshaft/Transmission

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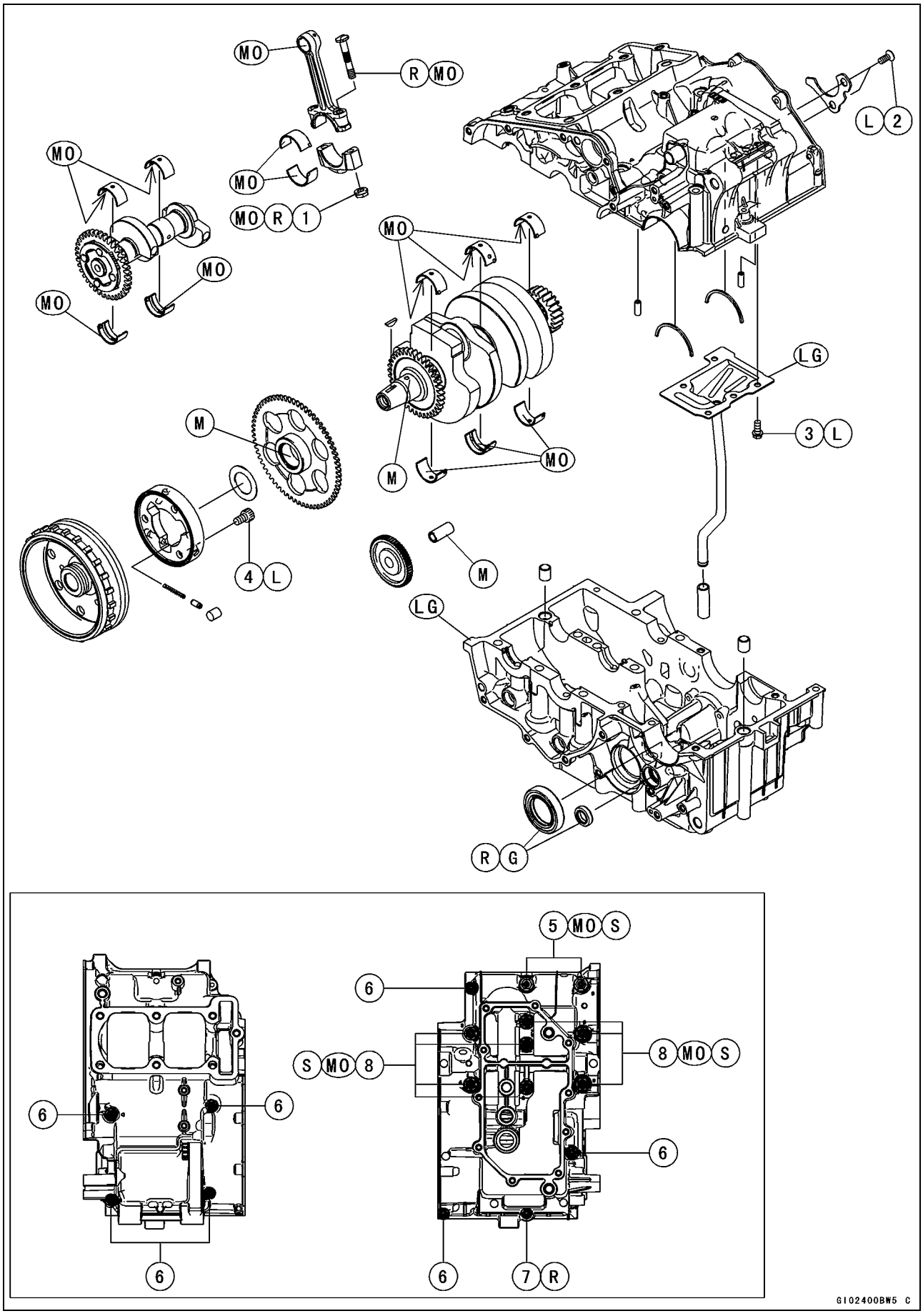
Exploded View

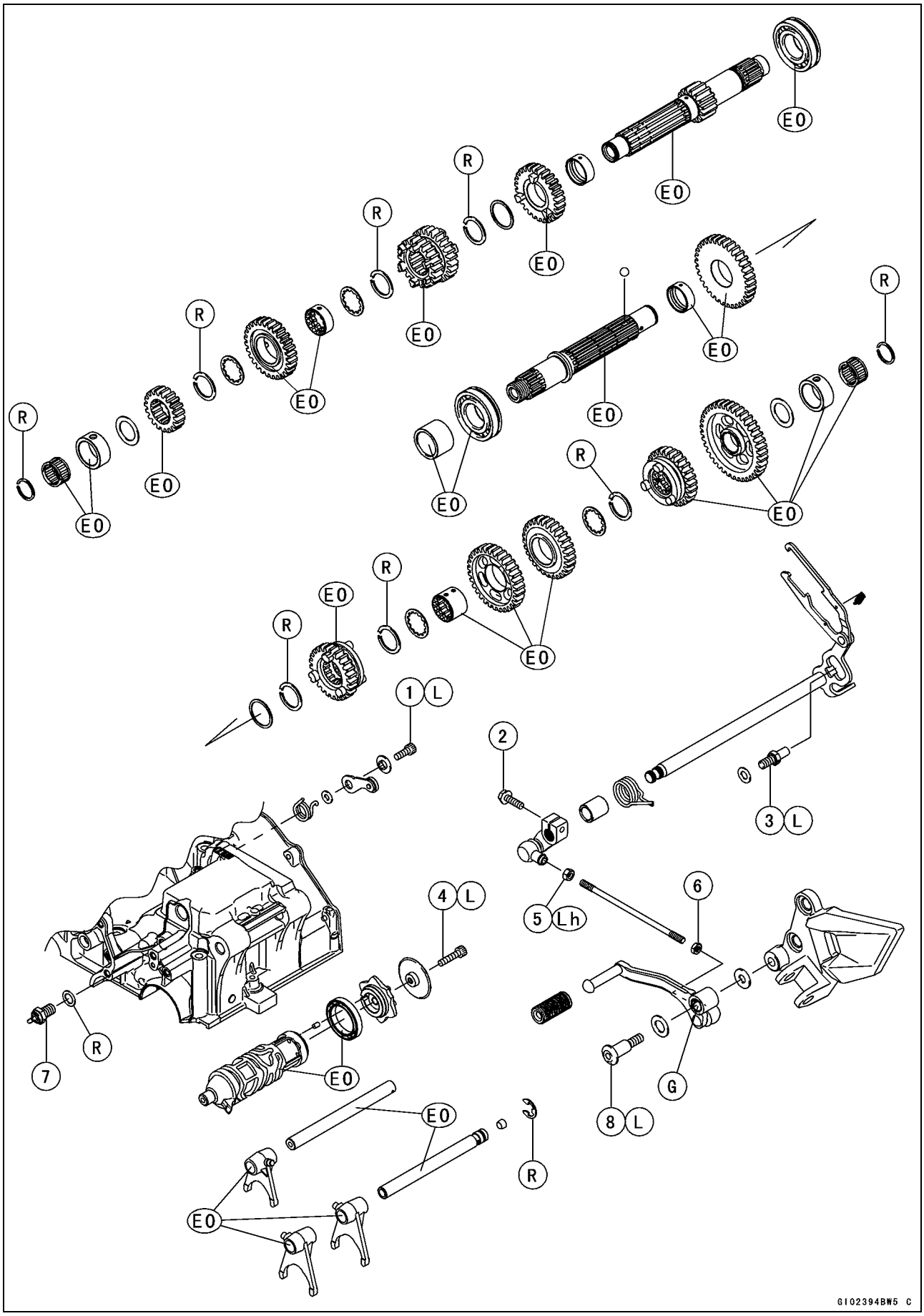


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Big End Nuts	see the text	←	←	MO, R
2	Shift Drum Bearing Holder Screws	4.4	0.45	39 in·lb	L
3	Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
4	Starter Motor Clutch Bolts	34.3	3.50	25.3	L
5	Crankcase Bolts (M8, L = 73 mm)	23.5	2.40	17.3	MO, S
6	Crankcase Bolts (M6, L = 38, 60, 85 mm)	11	1.1	97 in·lb	
7	Crankcase Bolt (M6, L = 135 mm)	11	1.1	97 in·lb	R
8	Crankcase Bolts (M8, L = 90 mm)	27.5	2.80	20.3	MO, S

G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket (ThreeBond TB1216B).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Gear Positioning Lever Bolt	12	1.2	106 in·lb	L
2	Shift Lever Bolt	12	1.2	106 in·lb	
3	Shift Shaft Return Spring Pin	19.6	2.0	14.5	L
4	Shift Drum Cam Bolt	9.0	0.92	80 in·lb	L
5	Tie-Rod Locknut (Front)	9.8	1.0	87 in·lb	Lh
6	Tie-Rod Locknut (Rear)	9.8	1.0	87 in·lb	
7	Neutral Switch	15	1.5	11	
8	Shift Pedal Mounting Bolt	12	1.2	106 in·lb	L

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
Lh: Left-hand Threads
R: Replacement Parts

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods		
Connecting Rod Bend	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Twist	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Big End Side Clearance	0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)	0.58 mm (0.023 in.)
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.032 ~ 0.066 mm (0.0013 ~ 0.0026 in.)	0.10 mm (0.0039 in.)
Crankpin Diameter:	29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)	29.97 mm (1.1799 in.)
Marking		
None	29.984 ~ 29.994 mm (1.1805 ~ 1.1809 in.)	– – –
○	29.995 ~ 30.000 mm (1.1809 ~ 1.1811 in.)	– – –
Connecting Rod Big End Inside Diameter:	33.000 ~ 33.016 mm (1.2992 ~ 1.2998 in.)	– – –
Marking		
None	33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)	– – –
○	33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)	– – –
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.480 ~ 1.485 mm (0.05827 ~ 0.05846 in.)	– – –
Black	1.485 ~ 1.490 mm (0.05846 ~ 0.05866 in.)	– – –
Blue	1.489 ~ 1.494 mm (0.05862 ~ 0.05882 in.)	– – –
Crankshaft Side Clearance	0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)	0.40 mm (0.0157 in.)
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.016 ~ 0.048 mm (0.0006 ~ 0.0019 in.)	0.08 mm (0.0031 in.)
Crankshaft Main Journal Diameter:	27.984 ~ 28.000 mm (1.1017 ~ 1.1024 in.)	27.96 mm (1.101 in.)
Marking		
None	27.984 ~ 27.992 mm (1.1017 ~ 1.1020 in.)	– – –
1	27.993 ~ 28.000 mm (1.1021 ~ 1.1024 in.)	– – –
Crankcase Main Bearing Inside Diameter:	31.000 ~ 31.016 mm (1.2205 ~ 1.2211 in.)	– – –

Specifications

Item	Standard	Service Limit
Marking		
○	31.000 ~ 31.008 mm (1.2205 ~ 1.2208 in.)	– – –
None	31.009 ~ 31.016 mm (1.2208 ~ 1.2211 in.)	– – –
Crankshaft Main Bearing Insert Thickness:		
Black	1.495 ~ 1.499 mm (0.05885 ~ 0.05902 in.)	– – –
Blue	1.499 ~ 1.503 mm (0.05902 ~ 0.05917 in.)	– – –
Yellow	1.503 ~ 1.507 mm (0.05917 ~ 0.05933 in.)	– – –
Balancer		
Balancer Shaft Bearing Insert/Journal Clearance	0.014 ~ 0.050 mm (0.0006 ~ 0.0020 in.)	0.08 mm (0.0031 in.)
Balancer Shaft Journal Diameter:	25.984 ~ 26.000 mm (1.0230 ~ 1.0236 in.)	25.96 mm (1.022 in.)
Marking		
None	25.984 ~ 25.994 mm (1.0230 ~ 1.0234 in.)	– – –
○	25.995 ~ 26.000 mm (1.0234 ~ 1.0236 in.)	– – –
Balancer Shaft Bearing Inside Diameter:	29.000 ~ 29.016 mm (1.1417 ~ 1.1424 in.)	– – –
Marking		
○	29.000 ~ 29.008 mm (1.1417 ~ 1.1420 in.)	– – –
None	29.009 ~ 29.016 mm (1.1421 ~ 1.1424 in.)	– – –
Balancer Shaft Bearing Insert Thickness:		
Brown	1.495 ~ 1.499 mm (0.05885 ~ 0.05902 in.)	– – –
Black	1.499 ~ 1.503 mm (0.05902 ~ 0.05917 in.)	– – –
Blue	1.503 ~ 1.507 mm (0.05917 ~ 0.05933 in.)	– – –
Transmission		
Shift Fork Ear Thickness	4.9 ~ 5.0 mm (0.193 ~ 0.197 in.)	4.8 mm (0.189 in.)
Gear Groove Width	5.05 ~ 5.15 mm (0.199 ~ 0.203 in.)	5.3 mm (0.209 in.)
Shift Fork Guide Pin Diameter	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.228 in.)
Shift Drum Groove Width	6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)	6.3 mm (0.248 in.)

Specifications

Connecting Rod Big End Bearing Insert Selection

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0784
None	None	Black	92139-0783
○	○		
○	None	Blue	92139-0782

Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Black	92139-0787	1, 3
			92139-0791	2
None	1	Blue	92139-0786	1, 3
○	None		92139-0790	2
None	None	Yellow	92139-0788	1, 3
			92139-0792	2

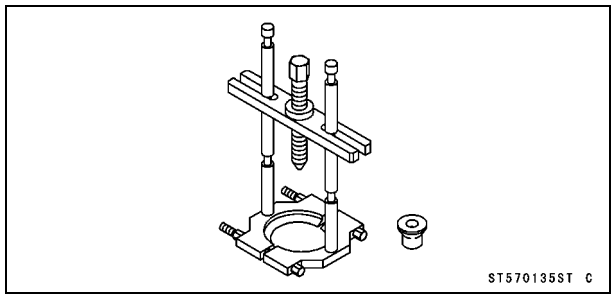
*: The bearing insert for Nos. 2 journal have an oil groove.

Balancer Shaft Bearing Insert Selection

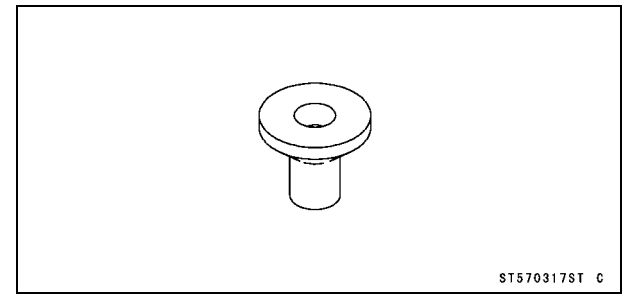
Balancer Shaft Journal Diameter Marking	Balancer Shaft Bearing Inside Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1424
○	None	Black	92028-1423
None	○		
None	None	Blue	92028-1422

Special Tools and Sealant

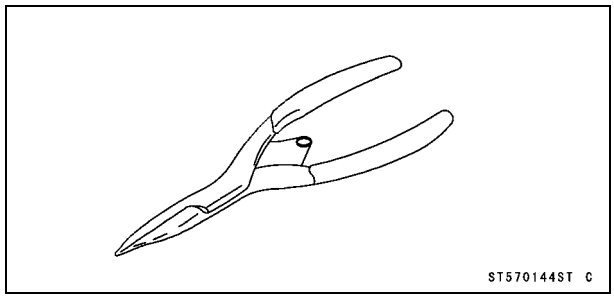
Bearing Puller:
57001-135



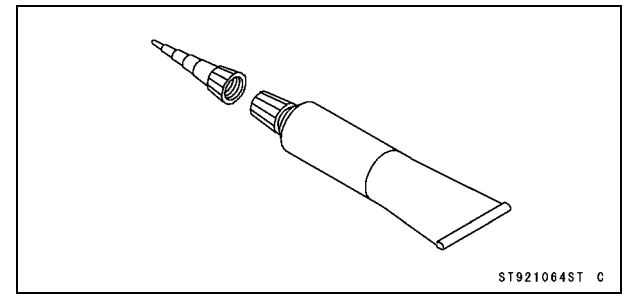
Bearing Puller Adapter:
57001-317



Outside Circlip Pliers:
57001-144



Liquid Gasket, TB1216B:
92104-1064



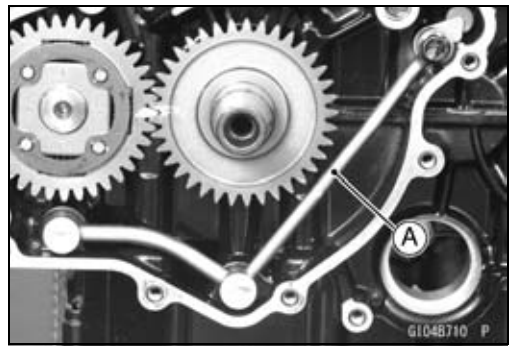
Crankcase

Crankcase Splitting

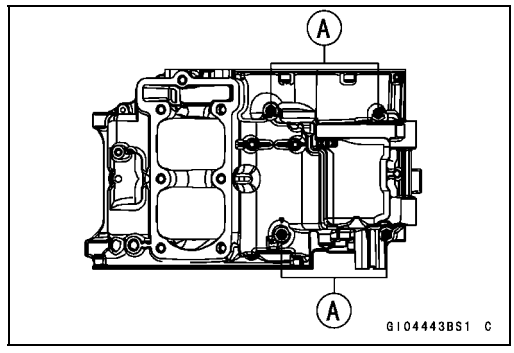
- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  Cylinder (see Cylinder Removal in the Engine Top End chapter)
  Clutch (see Clutch Removal in the Clutch chapter)
  External Shift Mechanism (see External Shift Mechanism Removal)
  Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  Water Pump (see Water Pump Removal in the Cooling System chapter)
  Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
  Oil Pressure Switch (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)

★If the crankshaft is to be removed, remove the pistons (see Piston Removal in the Engine Top End chapter).

- Remove the oil pipe [A].

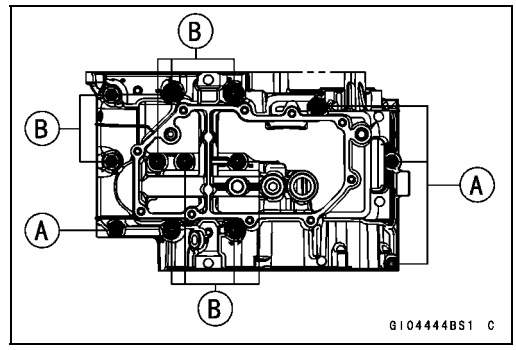


- Remove the upper crankcase bolts [A].

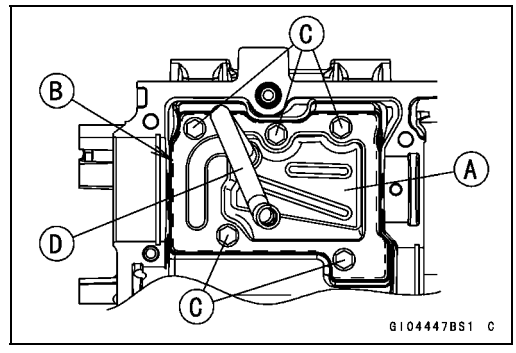


Crankcase

● Remove:
Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
Oil Screen (see Oil Pan Removal in the Engine Lubrication System chapter)
Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal in the Engine Lubrication System chapter)
● Remove the lower crankcase bolts.
○First, loosen the M6 bolts [A].
○Lastly, loosen the M8 bolts [B].
● Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.
○Take care not to damage the crankcase.



★If the breather plate [A] is to be removed, follow the next procedure.
○Cut the gasket around the plate [B].
○Remove:
Breather Plate Bolts [C]
Breather Plate with Pipe [D]



Crankcase Assembly

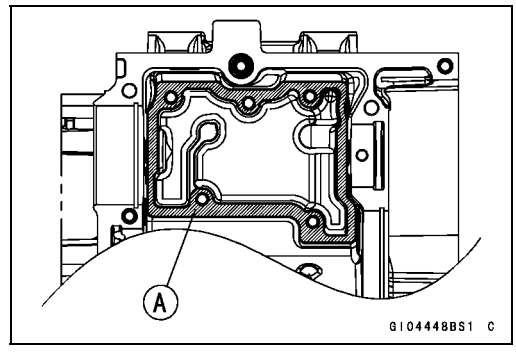
NOTICE

The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

● With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
● Using compressed air, blow out the oil passages in the crankcase halves.

★If the breather plate was removed, install it in the following procedure.
○Clean off any oil or dirt and apply liquid gasket to the breather plate mating surface [A], and then install the breather plate.

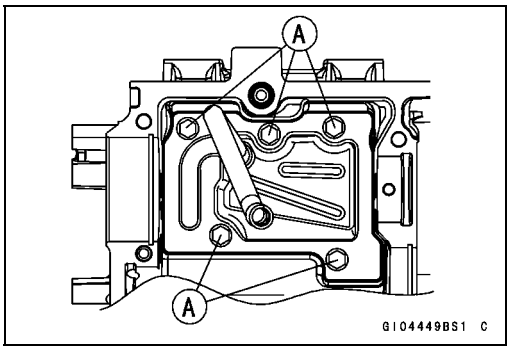
Sealant - Liquid Gasket, TB1216B: 92104-1064



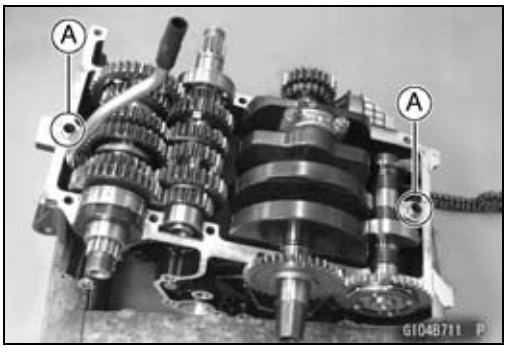
Crankcase

● Apply a non-permanent locking agent to the threads of the breather plate bolts [A] and tighten them.

Torque - Breather Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



● Install:
Shift Drum (see Shift Drum and Fork Installation)
Shift Forks and Shift Rods (see Shift Drum and Fork Installation)
Crankshaft (see Crankshaft Installation)
Balancer Shaft (see Balancer Installation)
Connecting Rods (see Connecting Rod Installation)
Camshaft Chain
Transmission Shafts and Gears (see Transmission Shaft Installation)
Dowel Pins [A]



● Before fitting the lower case on the upper case, check the following.
○Be sure to hang the camshaft chain on the crankshaft.
○Check to see that the shift drum and transmission gears are in the neutral position.

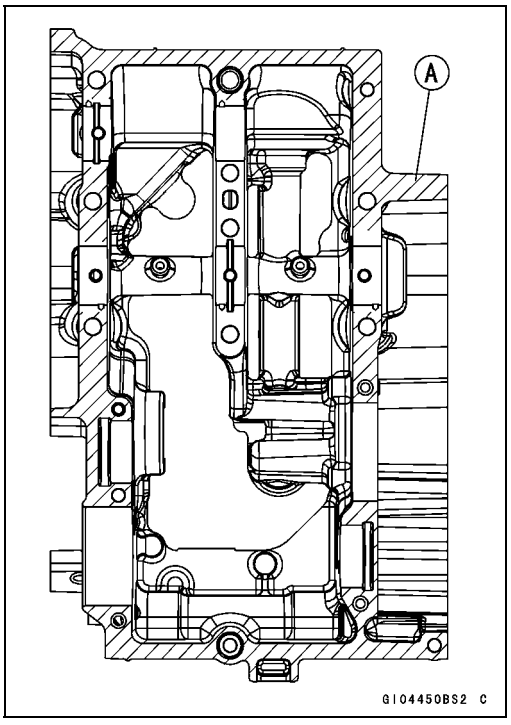
● Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTICE

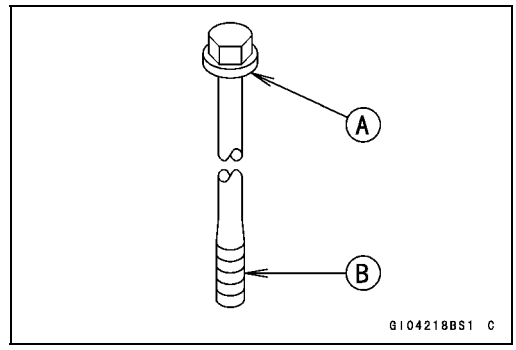
Do not apply liquid gasket around the crankshaft main bearing inserts, and oil passage holes.

● Fit the lower crankcase to the upper crankcase.



Crankcase

● Apply molybdenum disulfide oil solution to the seating surface [A] and threads [B] of the M8 bolts.



● Tighten the lower crankcase bolts using the following steps.
● Replace the crankcase bolt [A] (M6, L = 135 mm) with a new one.
○Following the sequence numbers on the lower crankcase half, tighten the M8 bolts [1 ~ 7] L= 90 mm (3.54 in.).

Torque - Crankcase Bolts (M8): 27.5 N·m (2.80 kgf·m, 20.3 ft·lb)

○Tighten the M8 bolts [8 ~ 9] L= 73 mm (2.87 in.).

Torque - Crankcase Bolts (M8): 23.5 N·m (2.40 kgf·m, 17.3 ft·lb)

○Tighten the M6 bolts.

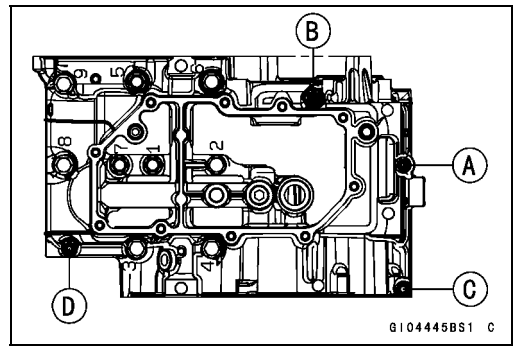
Torque - Crankcase Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)

L = 135 mm (5.31 in.) [A]

L = 85 mm (3.35 in.) [B] (with New Copper Washer)

L = 60 mm (2.36 in.) [C]

L = 38 mm (1.50 in.) [D]

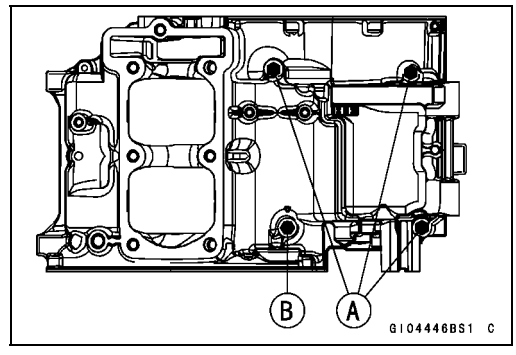


● Tighten the upper crankcase bolts in the order listed.

Torque - Crankcase Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)

L= 85 mm (3.35 in.) [A]

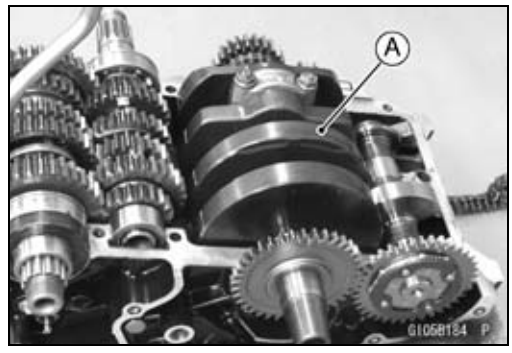
L= 60 mm (2.36 in.) [B] (with New Copper Washer)



● After tightening all crankcase bolts, check the following items.
○Wipe up the liquid gasket that seeps out around the crankcase mating surface.
○Crankshaft and transmission shafts turn freely.
○While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.
○When the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.
● Install the removed parts (see appropriate chapters).

Crankshaft and Connecting Rods

Crankshaft Removal



- Split the crankcase (see Crankcase Splitting).
- Remove the crankshaft [A].

Crankshaft Installation

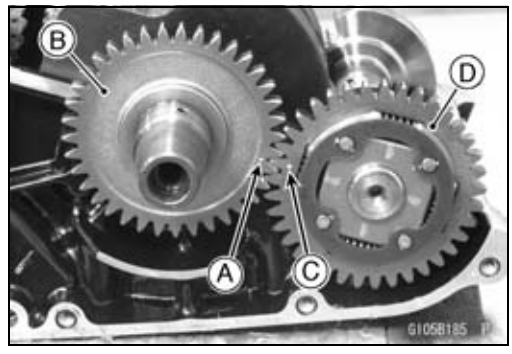
- Install the crankshaft.

NOTE

○*If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing Insert Selection in the Specifications.*

NOTICE

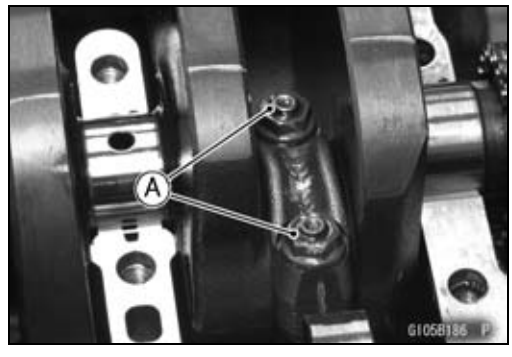
If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.



○Align the timing mark [A] on the balancer drive gear [B] with the timing mark [C] on the balancer gear [D].

- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.

Connecting Rod Removal



- Split the crankcase (see Crankcase Splitting).
- Remove:
  Connecting Rod Big End Nuts [A]

NOTE

○*Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.*

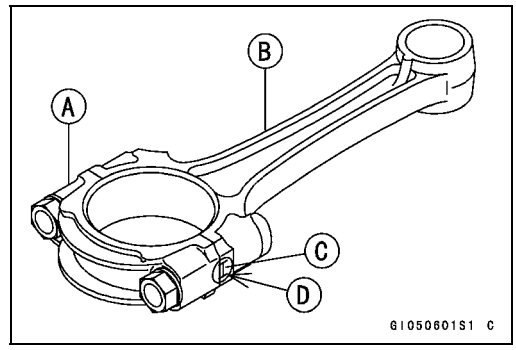
- Remove the connecting rods from the crankshaft.

NOTICE

Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Crankshaft and Connecting Rods

Connecting Rod Installation



NOTICE

To minimize vibration, the connecting rods should have the same weight mark.

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark

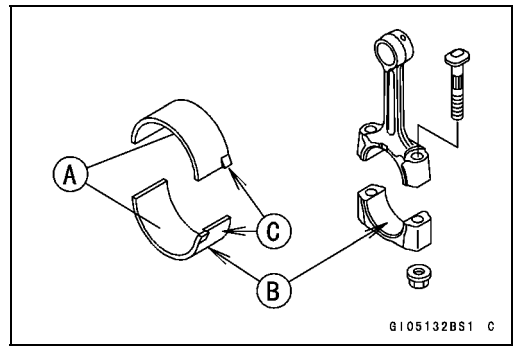
NOTICE

If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse them.

- Replace the connecting rod big end bolts and nuts with new ones.



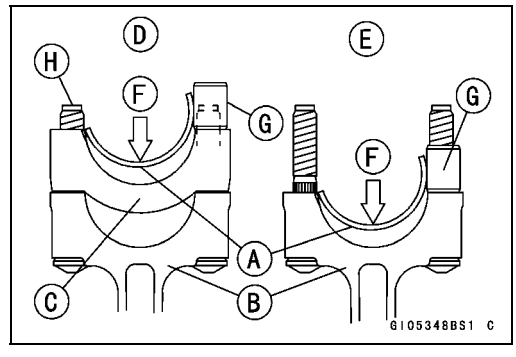
- Apply molybdenum disulfide oil solution to the inner surfaces of upper and lower bearing inserts [A].

○Do not apply any grease or oil to the cap inside and cap insert outside [B].

○Install the inserts so that their nails [C] are on the same side and fit them into the recess of the connecting rod and cap.

NOTICE

Wrong application of oil and grease could cause bearing damage.



○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.
Installation [D] to Cap
Installation [E] to Connecting Rod
Push [F]
Spare Dowel Pin [G]
Connecting Rod Bolts [H]

- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Remove debris and clean the surface of inserts.

Crankshaft and Connecting Rods

● Install each connecting rod on its original crankpin.
○The connecting rod big end is bolted using the “plastic region fastening method”.
○This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.
○There are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.

NOTICE

Be careful not to overtighten the nuts.
The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.

(1) Bolt Length Measurement Method
● Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

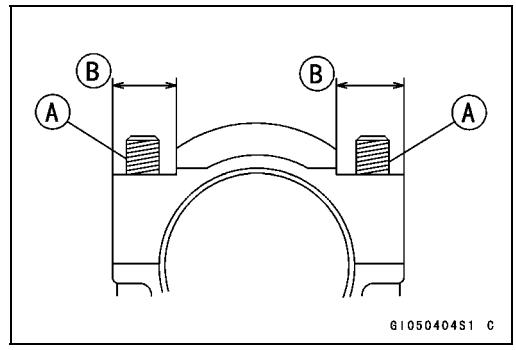
⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

Immediately dry the bolts and nuts with compressed air after cleaning. Clean and dry the bolts and nuts completely.

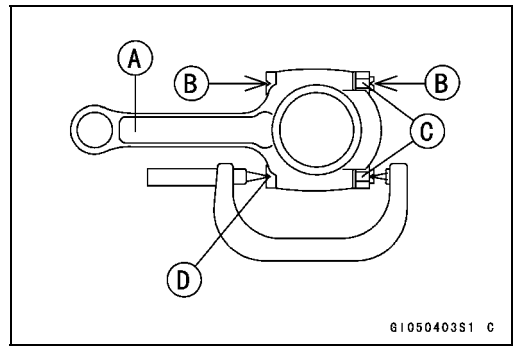
Crankshaft and Connecting Rods



- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assy was replaced, use the new bolts and nuts attached to the new connecting rod assy.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods



- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
  Connecting Rod [A]
  Dent here with a punch [B].
  Nuts [C]
  Fit micrometer pins into dents [D].
- Tighten the big end nuts until the bolt elongation reaches the length specified as follows.

Bolt Length after tightening – Bolt Length before tightening = Bolt Stretch

Connecting Rod Bolt Stretch
Usable Range: 0.15 ~ 0.25 mm (0.0059 ~ 0.0098 in.)

- Check the length of the connecting rod bolts.

★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

(2) Rotation Angle Method

★If you do not have a point micrometer, you may tighten the nuts using the “Rotation Angle Method”.

- Be sure to clean the bolts, nuts and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts and nuts are treated with an anti -rust solution.

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

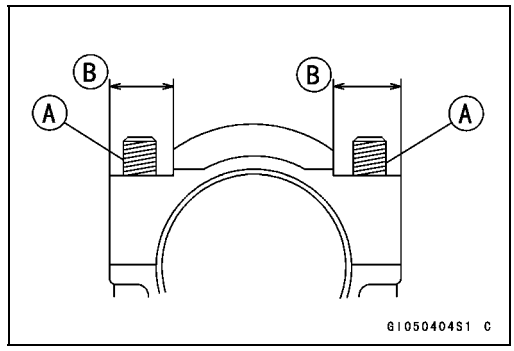
Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

- Install new bolts and nuts in reused connecting rod.

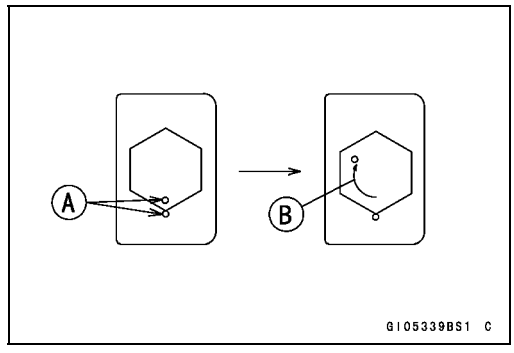
★If the connecting rod assy was replaced, use the new bolts and nuts attached to the new connecting rod assy.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods



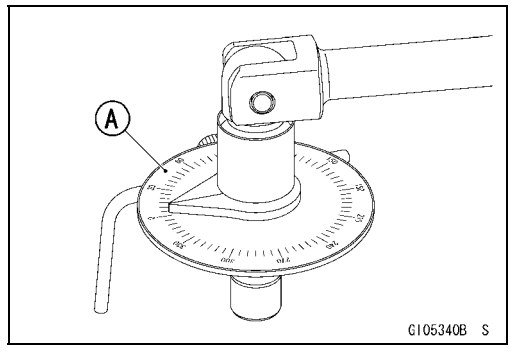
- First, tighten the nuts with **10.0 N·m (1.02 kgf·m, 89 in·lb)** of torque.
- Next, tighten the nuts **120°**.

○Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 120° [B] properly.



Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, in·lb)
New	Attached to new con-rod	Attached to new con-rod	10.0 (1.02, 89) + 120°
	New	New	
Used	Replace the bolts with new ones	Replace the nuts with new ones	10.0 (1.02, 89) + 120°

○The nuts can be tightened by using a torque angle gauge [A].

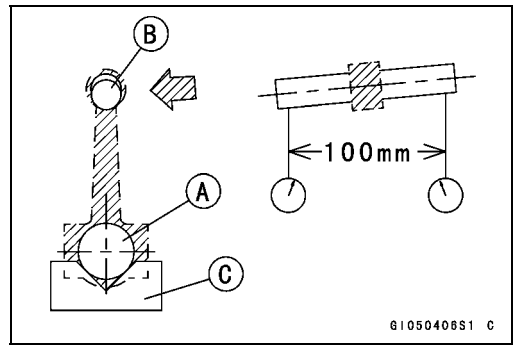


Crankshaft/Connecting Rod Cleaning

- After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Crankshaft and Connecting Rods

Connecting Rod Bend Inspection

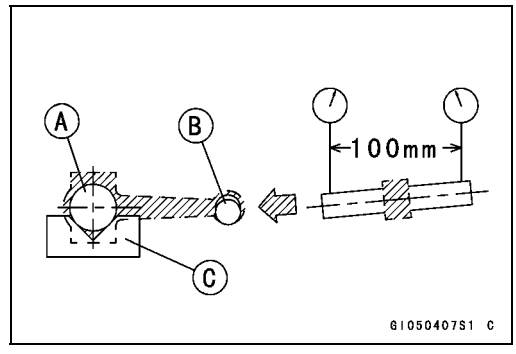


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If the connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Twist Inspection

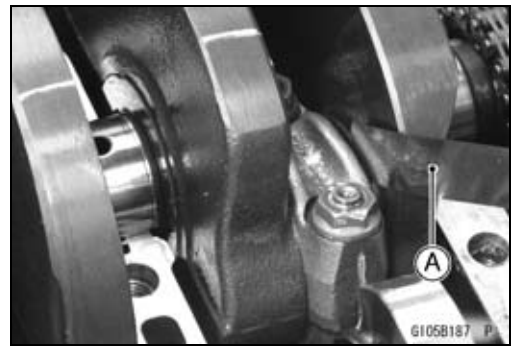


- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★If the connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Big End Side Clearance Inspection



- Measure the connecting rod big end side clearance.

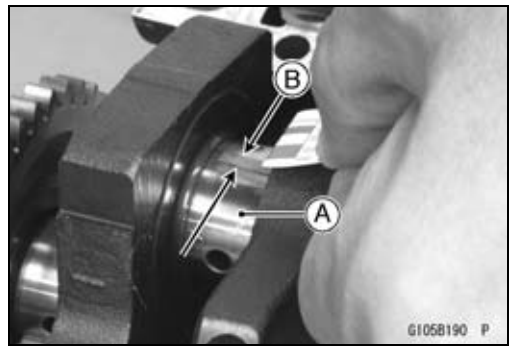
○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)
Service Limit: 0.58 mm (0.023 in.)

★If the clearance exceeds the service limit, replace the connecting rod with new one and then check the clearance again. If the clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

Crankshaft and Connecting Rods

Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection



- Measure the bearing insert/crankpin [A] clearance with plastigage [B].
- Tighten the big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

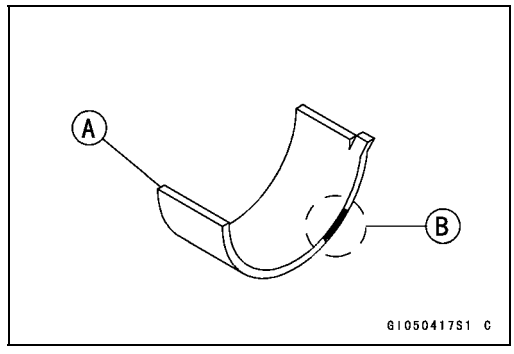
Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.032 ~ 0.066 mm (0.0013 ~ 0.0026 in.)

Service Limit: 0.10 mm (0.0039 in.)

★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.066 mm (0.0026 in.) and the service limit 0.10 mm (0.0039 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check the insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.



★If the clearance exceeds the service limit, measure the diameter of the crankpins.

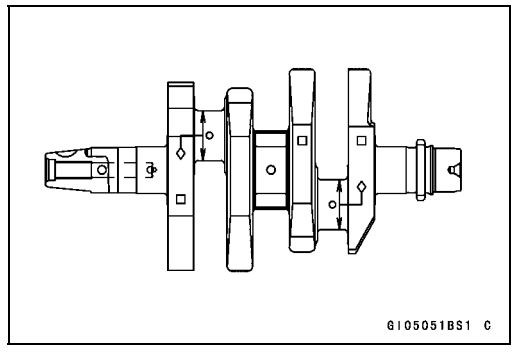
Crankpin Diameter

Standard: 29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)

Service Limit: 29.97 mm (1.1799 in.)

★If any crankpin has worn past the service limit, replace the crankshaft with a new one.

★If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.



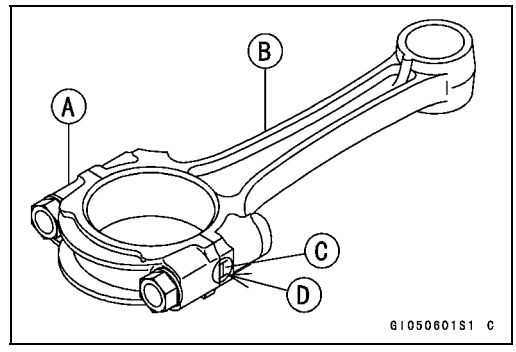
Crankpin Diameter Marks

None: 29.984 ~ 29.994 mm (1.1805 ~ 1.1809 in.)

○: 29.995 ~ 30.000 mm (1.1809 ~ 1.1811 in.)

◊: Crankpin Diameter Marks, "○" or no mark.

Crankshaft and Connecting Rods



- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

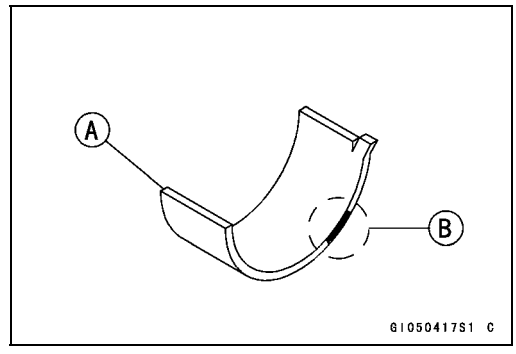
○*The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Inside Diameter Marks

None: 33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)

○: 33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark

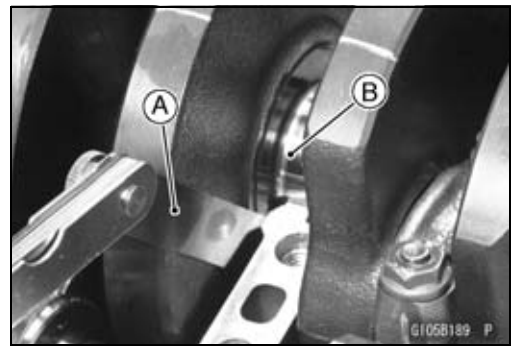


- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0784
None	None	Black	92139-0783
○	○		
○	None	Blue	92139-0782

- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

Crankshaft Side Clearance Inspection



- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the No. 2 journal [B] to determine clearance.

★If the clearance exceeds the service limit, replace the crankcase halves as a set.

NOTE

○*The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.*

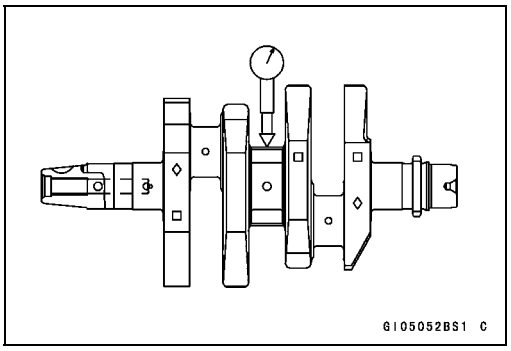
Crankshaft Side Clearance

Standard: 0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)

Service Limit: 0.40 mm (0.0157 in.)

Crankshaft and Connecting Rods

Crankshaft Runout Inspection

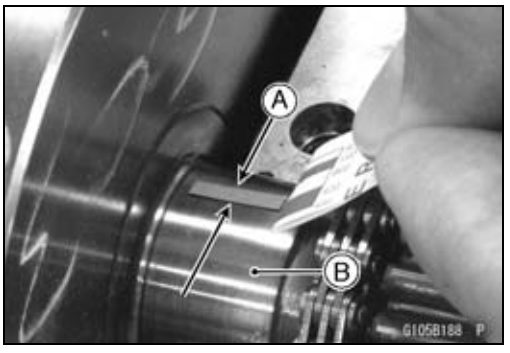


- Measure the crankshaft runout.

★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout
Standard: TIR 0.02 mm (0.0008 in.) or less
Service Limit: TIR 0.05 mm (0.0020 in.)

Crankshaft Main Bearing Insert/Journal Wear Inspection

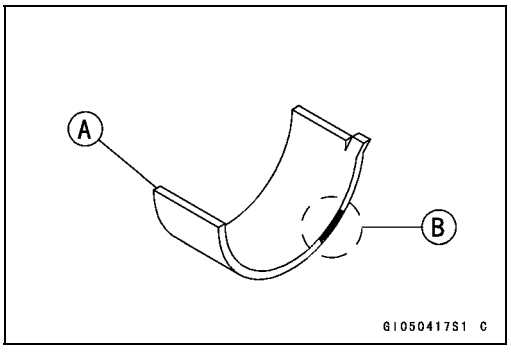


- Using a plastigage (press gauge), measure the bearing insert/journal [B] clearance [A].

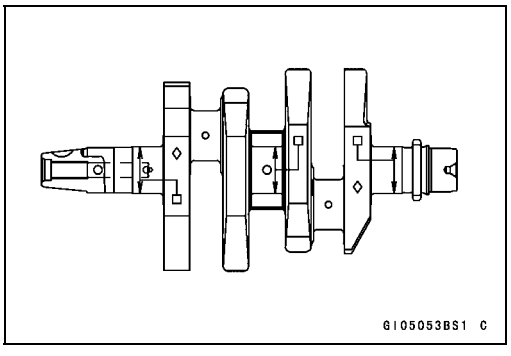
NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*
○*Do not turn the crankshaft during clearance measurement.*
○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*

Crankshaft Main Bearing Insert/Journal Clearance
Standard: 0.016 ~ 0.048 mm (0.0006 ~ 0.0019 in.)
Service Limit: 0.08 mm (0.0031 in.)



★If the clearance is within the standard, no bearing replacement is required.
★If the clearance is between 0.048 mm (0.0019 in.) and the service limit 0.08 mm (0.0031 in.), replace the bearing inserts [A] with inserts painted yellow [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



Crankshaft Main Journal Diameter
Standard: 27.984 ~ 28.000 mm (1.1017 ~ 1.1024 in.)
Service Limit: 27.96 mm (1.101 in.)

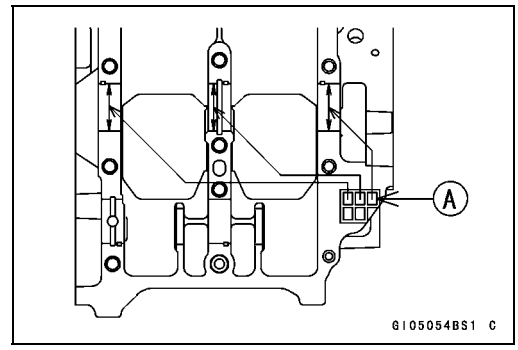
★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankshaft Main Journal Diameter Marks
None: 27.984 ~ 27.992 mm (1.1017 ~ 1.1020 in.)
1: 27.993 ~ 28.000 mm (1.1021 ~ 1.1024 in.)

□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

Crankshaft and Connecting Rods

- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
  [A]: Crankcase Main Bearing Inside Diameter Marks, "○" or no mark.

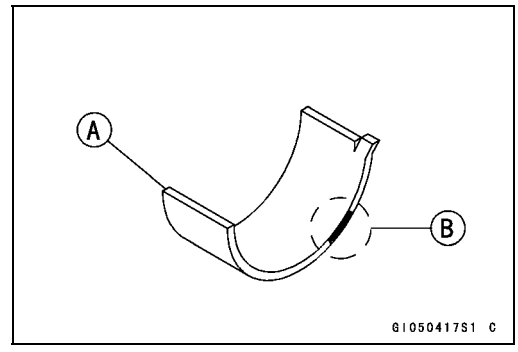


NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*
○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankcase Main Bearing Inside Diameter Marks
○: 31.000 ~ 31.008 mm (1.2205 ~ 1.2208 in.)
None: 31.009 ~ 31.016 mm (1.2208 ~ 1.2211 in.)

- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
  Size Color [B]



Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Black	92139-0787	1, 3
			92139-0791	2
None	1	Blue	92139-0786	1, 3
○	None		92139-0790	2
None	None	Yellow	92139-0788	1, 3
			92139-0792	2

*: The bearing insert for Nos. 2 journal have an oil groove.

- Install the new inserts in the crankcase halves and check insert/journal clearance with the plastigage.

Starter Motor Clutch

Starter Motor Clutch Removal/Installation

- Refer to the Alternator Rotor Removal/Installation in the Electrical System chapter.

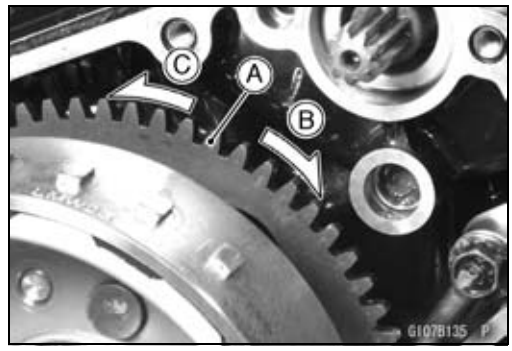
Starter Motor Clutch Inspection

- Remove:
  Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  Starter Idle Gear and shaft
- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].

★If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.

- Disassemble the starter motor clutch, and visually inspect the clutch parts.

★If there is any worn or damaged part, replace it.

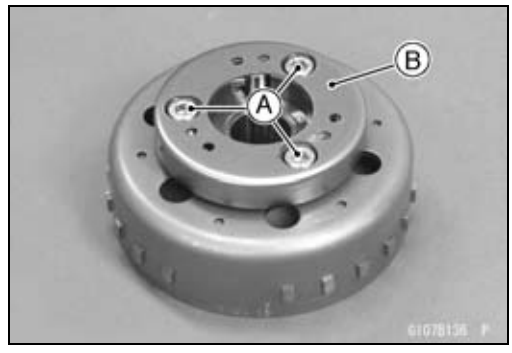


NOTE

○*Examine the starter motor clutch gear as well. Replace it if it worn or damaged.*

Starter Motor Clutch Disassembly

- Remove:
  Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  Starter Motor Clutch Bolts [A]
  Starter Motor Clutch [B]



Starter Motor Clutch Assembly

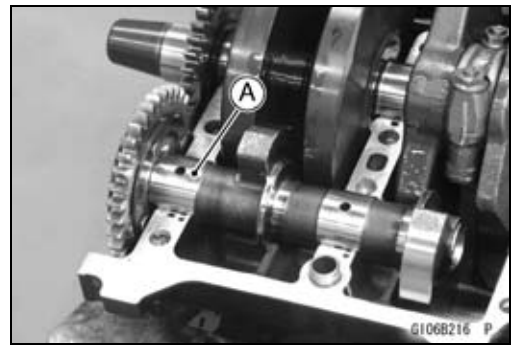
- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque - Starter Motor Clutch Bolts: 34.3 N·m (3.50 kgf·m, 25.3 ft·lb)

Balancer

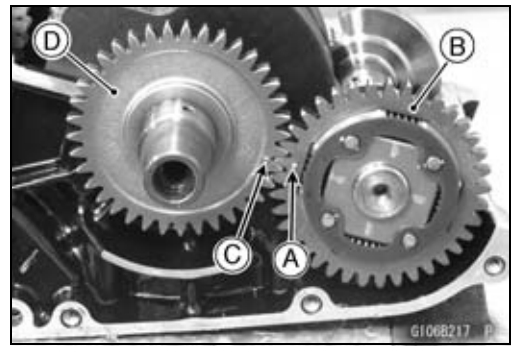
Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the balancer shaft [A] with the balancer gear.



Balancer Installation

- Install the balancer shaft.
  - ○Align the timing mark [A] on the balancer gear [B] with the timing mark [C] on the balancer drive gear [D].
- Apply molybdenum disulfide oil solution to the balancer shaft bearing inserts.

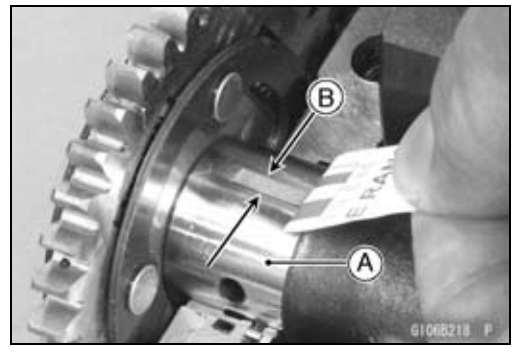


Balancer Shaft Bearing Insert/Journal Wear Inspection

- Measure the bearing insert/journal [A] clearance with plastigage [B].

NOTE

- ○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*
- ○*Do not turn the balancer shaft during clearance measurement.*
- ○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*



Balancer Shaft Bearing Insert/Journal Clearance

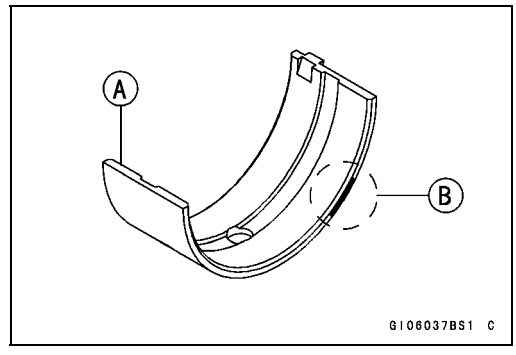
Standard: 0.014 ~ 0.050 mm (0.0006 ~ 0.0020 in.)

Service Limit: 0.08 mm (0.0031 in.)

★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.050 mm (0.0020 in.) and the service limit 0.08 mm (0.0031 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the balancer shaft journal.



Balancer Shaft Journal Diameter

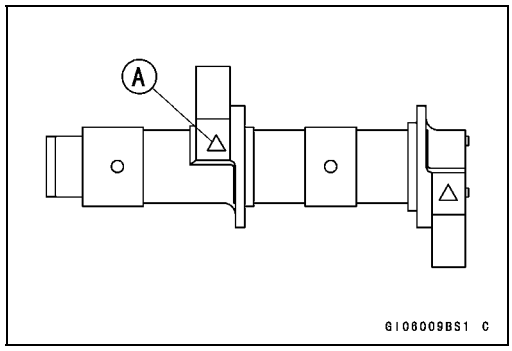
Standard: 25.984 ~ 26.000 mm (1.0230 ~ 1.0236 in.)

Service Limit: 25.96 mm (1.022 in.)

Balancer

★If any journal has worn past the service limit, replace the balancer shaft with a new one.

★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings [A] on the balancer shaft, make new marks on it.



Balancer Shaft Journal Diameter Marks

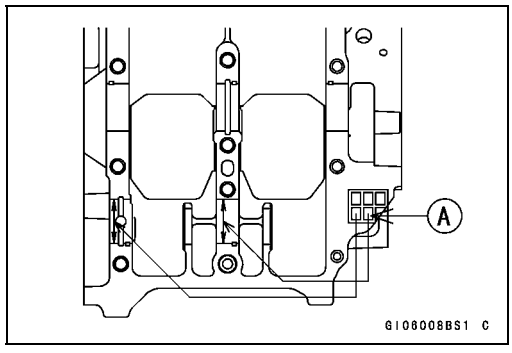
None: 25.984 ~ 25.994 mm (1.0230 ~ 1.0234 in.)

○: 25.995 ~ 26.000 mm (1.0234 ~ 1.0236 in.)

△: Balancer Shaft Journal Diameter Marks, "○" or no mark.

● Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.

[A]: Balancer Shaft Bearing Inside Diameter Marks, "○" or no mark.



NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*

○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Balancer Shaft Bearing Inside Diameter Marks

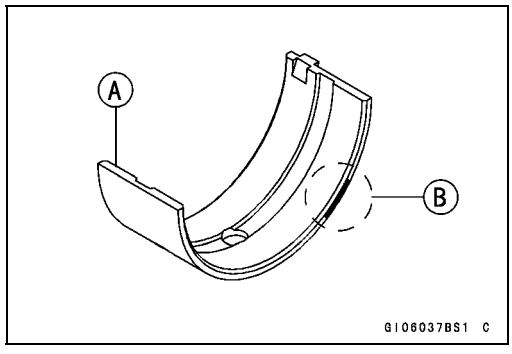
○: 29.000 ~ 29.008 mm (1.1417 ~ 1.1420 in.)

None: 29.009 ~ 29.016 mm (1.1421 ~ 1.1424 in.)

● Select the proper bearing insert [A] in accordance with the combination of the crankcase and balancer shaft coding.

Size Color [B]

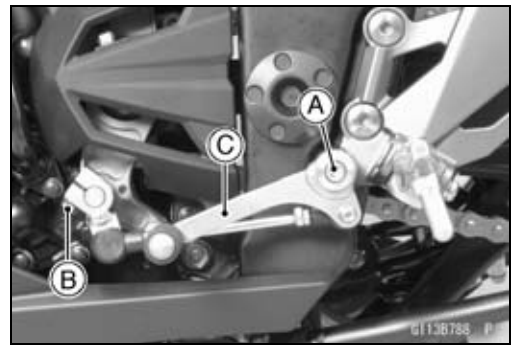
Balancer Shaft Journal Diameter Marking	Balancer Shaft Bearing Inside Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1424
○	None	Black	92028-1423
None	○		
None	None	Blue	92028-1422



● Install the new inserts in the crankcase and check insert/journal clearance with the plastigage.

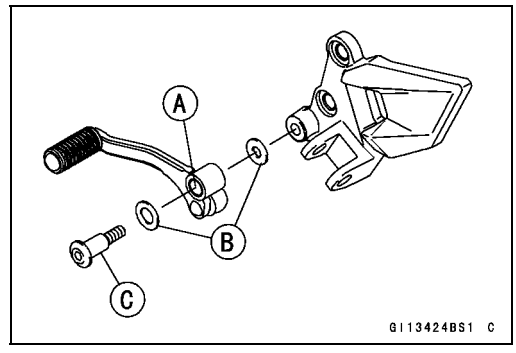
Transmission

Shift Pedal Removal



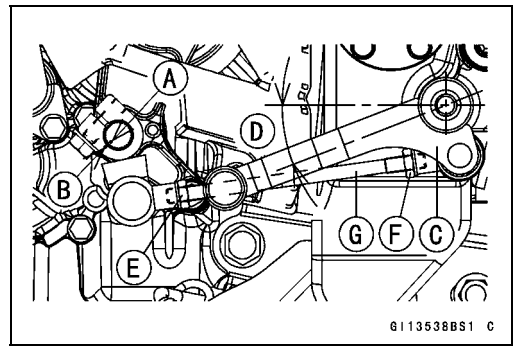
- Remove:
  Shift Pedal Mounting Bolt [A]
  Shift Lever Bolt [B]
  Shift Pedal [C] with Shift Lever

Shift Pedal Installation



- Apply grease to the shift pedal [A].
- Install the washers [B] and shift pedal.
- Apply a non-permanent locking agent to the threads of the shift pedal mounting bolt [C].
- Tighten:

Torque - Shift Pedal Mounting Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)



- Align the mark [A] on the shift shaft with the mark [B] on the shift lever.
- Tighten:

Torque - Shift Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install the shift pedal [C] as shown.
  About 20.5° [D]

○The lower end of shift pedal is positioned in the center of the tie-rod.

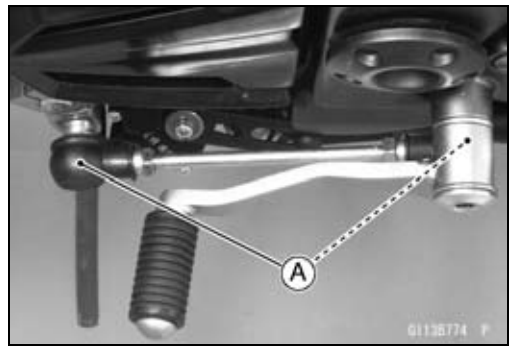
○To adjust the pedal position, loosen the front locknut [E] (left-hand threads) and rear locknut [F] and then turn the tie-rod [G].

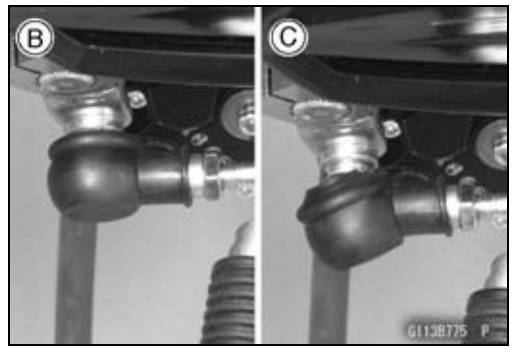
- Tighten:

Torque - Tie-Rod Locknuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Transmission

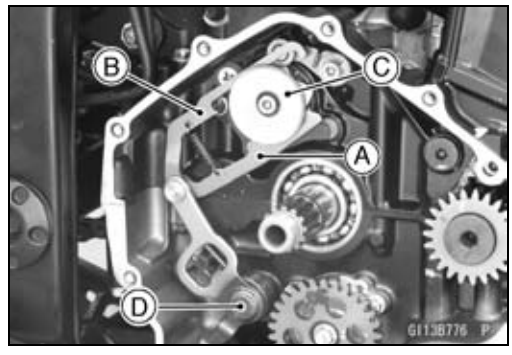
- Be sure the sealing lip of the rubber boots [A] fits into the groove of the ball joint after installing the shift lever link.
  Correctly Boot Fitting Position [B]
  Incorrectly Boot Fitting Position [C]





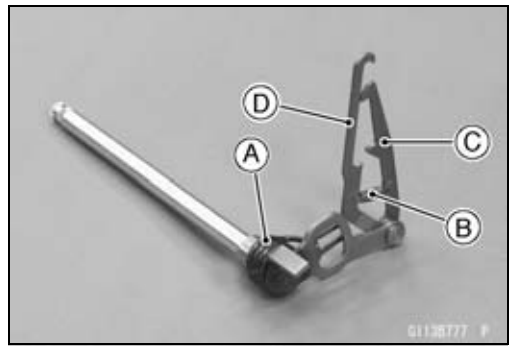
External Shift Mechanism Removal

- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Shift Lever (see Shift Pedal Removal)
  Clutch (see Clutch Removal in the Clutch chapter)
- Spread the shift mechanism arm [A] and over shift limiter [B] out of the shift drum [C], and pull out the shift shaft assembly [D].



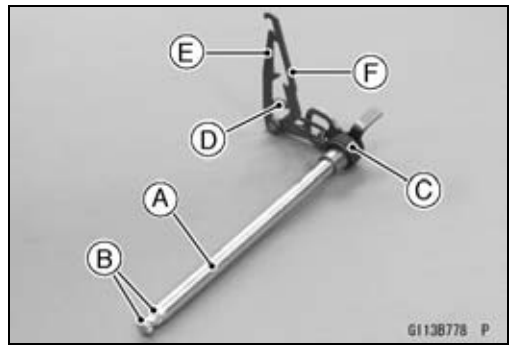
External Shift Mechanism Installation

- Check that the return spring [A] and pawl spring [B] are properly fitted on the mechanism.
- Install the shift shaft assembly.
- Place the shift mechanism arm [C] and over shift limiter [D] on the shift drum pins.
- Install the removed parts (see appropriate chapters).



External Shift Mechanism Inspection

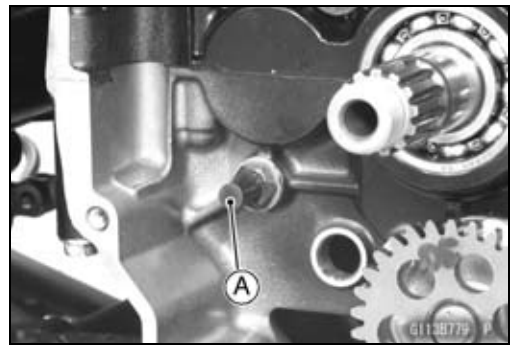
- Examine the shift shaft [A] for any damage.
- ★If the shaft is bent, straighten or replace it.
- ★If the splines [B] are damaged, replace the shaft.
- ★If the return spring [C] or pawl spring [D] is damaged in any way, replace them.
- ★If the shift mechanism arm [E] or over shift limiter [F] is damaged in any way, replace the shaft.



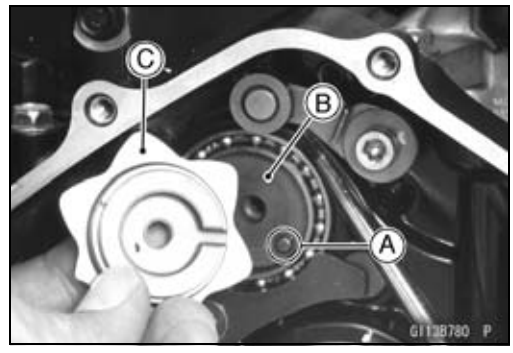
Transmission

● Check the return spring pin [A] is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Shift Shaft Return Spring Pin: 19.6 N·m (2.0 kgf·m, 14.5 ft·lb)

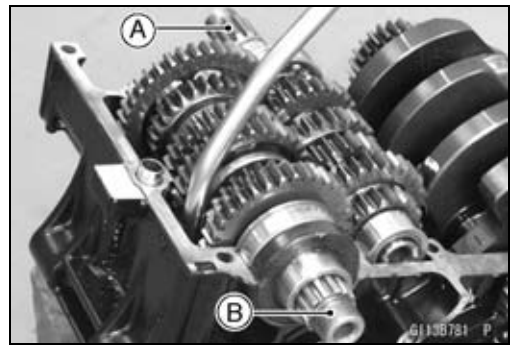


● Visually inspect the shift drum pins [A], pin holder [B] and pin plate [C].
★If they are badly worn or if they show any damage, replace them.



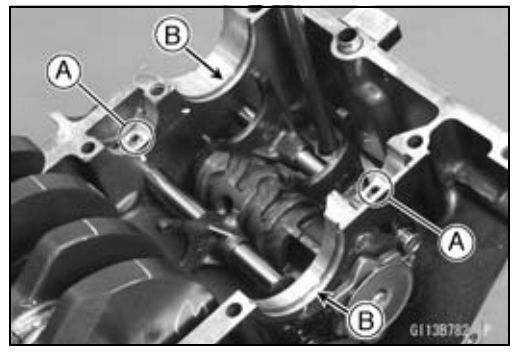
Transmission Shaft Removal

● Split the crankcase (see Crankcase Splitting).
● Remove the drive shaft [A] and output shaft [B].

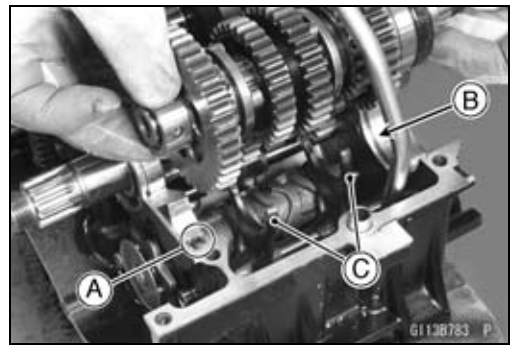


Transmission Shaft Installation

● Check to see that the set pins [A] and set rings [B] are in place.



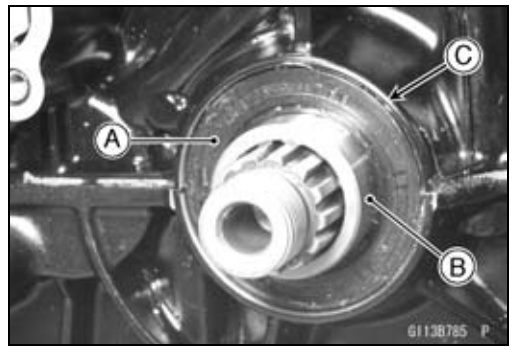
● Install the drive shaft and output shaft into the upper crankcase half aligning the followings:
Set Pin [A] with Hole
Set Ring [B] with Groove
Shift Forks [C] with Grooves on the Gear



Transmission

● Apply engine oil to the bearings.
○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races.

● Assemble the crankcase (see Crankcase Assembly).
● Press in the oil seal [A] onto collar [B] so that the surface of the oil seal is flush with the counterbore bottom surface [C] of the crankcase.
○Apply grease to the oil seal lips.

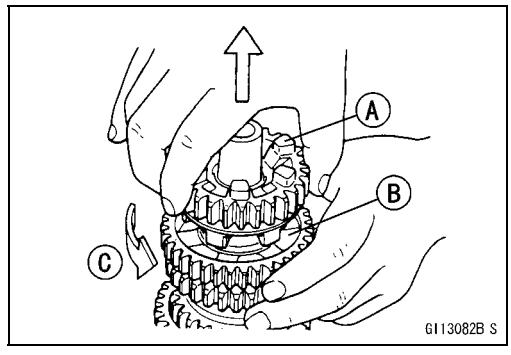


Transmission Shaft Disassembly

● Remove the transmission shafts (see Transmission Shaft Removal).
● Remove the circlips, disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

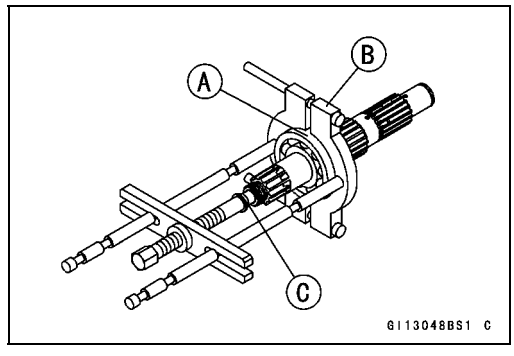
● The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.
○Set the output shaft in a vertical position holding the 3rd gear [B].
○Spin the 5th gear quickly [C] and pull it off upward.



● Remove the ball bearing [A] from each shafts.

Special Tools - Bearing Puller [B]: 57001-135
Bearing Puller Adapter [C]: 57001-317

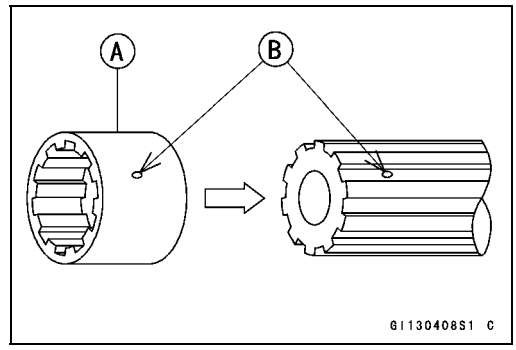
● Discard the bearing.



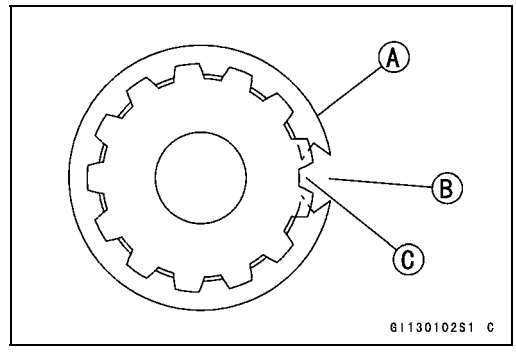
Transmission

Transmission Shaft Assembly

- Apply engine oil to the bushings, ball bearings and shafts.
- Install the ball bearings on the shafts with the groove toward the clutch side.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.

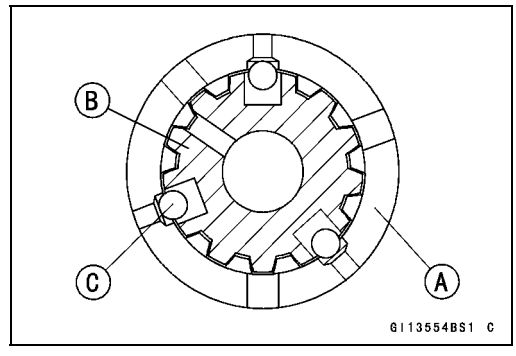


- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear bushing onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear onto the output shaft with their oil holes aligned.
- Install the 2nd and 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

- Fit the steel balls into the 5th gear holes in the output shaft, aligning oil hole as shown.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]



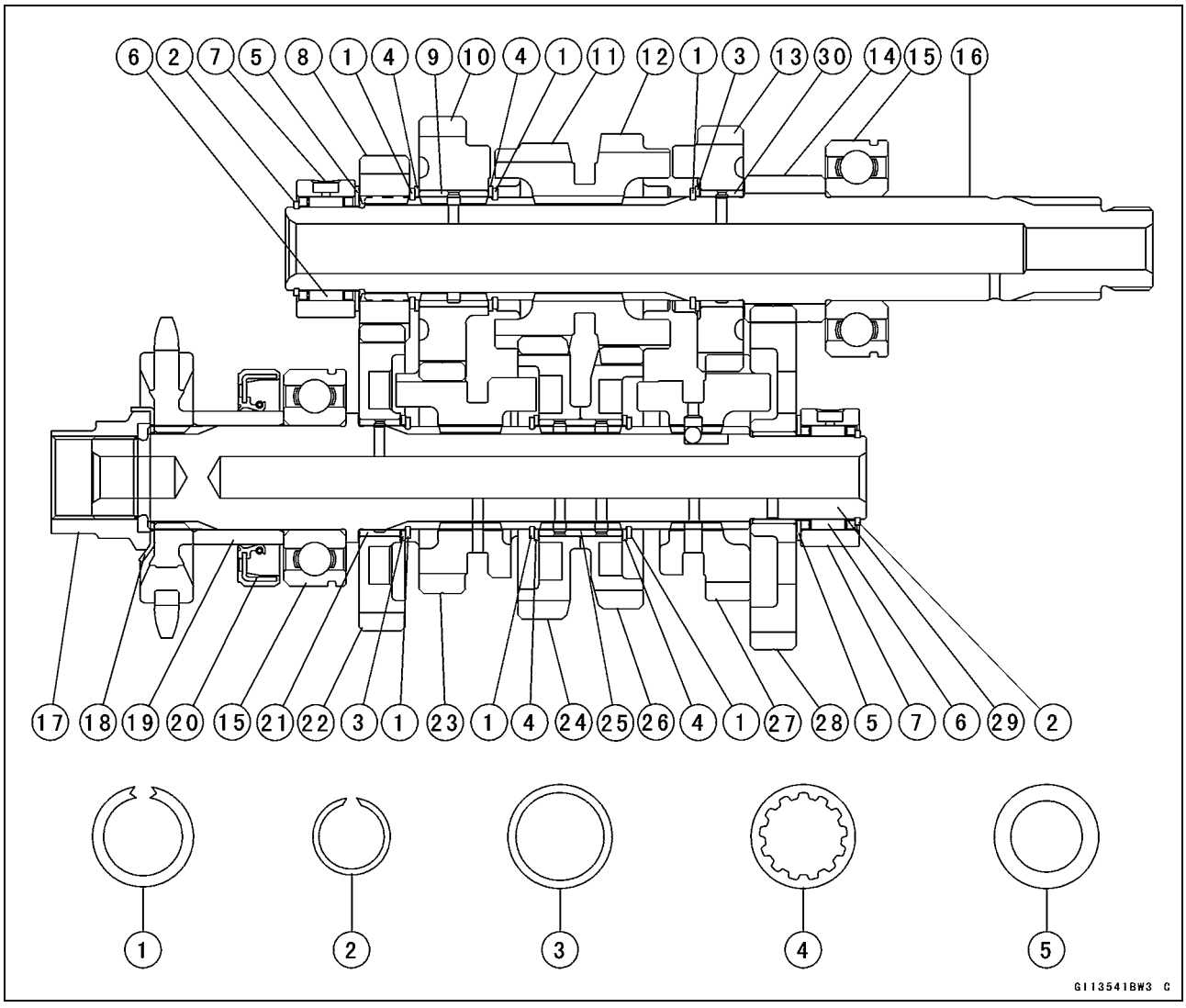
NOTICE

Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear doesn't come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

Transmission



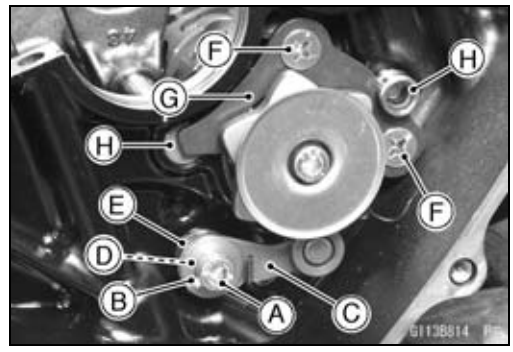
1. Circlip, ϕ29 mm (1.14 in.)
2. Circlip
3. Thrust Washer, ϕ30 mm (1.18 in.) (Inside Diameter: ϕ25.3 mm (0.996 in.))
4. Toothed Washer, ϕ30 mm (1.18 in.)
5. Thrust Washer, ϕ30 mm (1.18 in.) (Inside Diameter: ϕ20.5 mm (0.807 in.))
6. Needle Bearing
7. Bearing Outer Race
8. 2nd Gear
9. Bushing
10. 6th (Top) Gear
11. 3rd Gear
12. 4th Gear
13. 5th Gear
14. 1st Gear
15. Ball Bearing
16. Drive Shaft
17. Nut
18. Washer
19. Collar
20. Oil Seal
21. Bushing
22. 2nd Gear
23. 6th (Top) Gear
24. 3rd Gear
25. Bushing
26. 4th Gear
27. 5th Gear
28. 1st Gear
29. Output Shaft
30. Bushing

Transmission

Shift Drum and Fork Removal

● Remove:
Lower Crankcase Half (see Crankcase Splitting)
Transmission Shafts (see Transmission Shaft Removal)

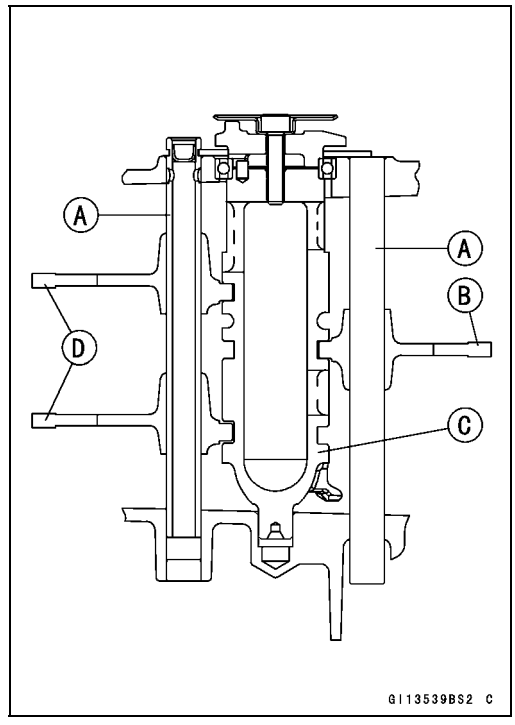
● Remove:
Gear Positioning Lever Bolt [A]
Spacer [B]
Gear Positioning Lever [C]
Washer [D]
Spring [E]
Shift Drum Bearing Holder Screws [F]
Shift Drum Bearing Holder [G]
Shift Rods [H]
Shift Forks



● Remove the shift drum from the upper crankcase.

Shift Drum and Fork Installation

● Apply engine oil to the shift drum, forks and rods.
● Insert the shift drum into the upper crankcase half.
● Install the shift rods [A], noting the groove position.
○Position the one with shorter ears [B] on the drive shaft and place the pin in the center groove in the shift drum [C].
○The two forks [D] on the output shaft are identical.

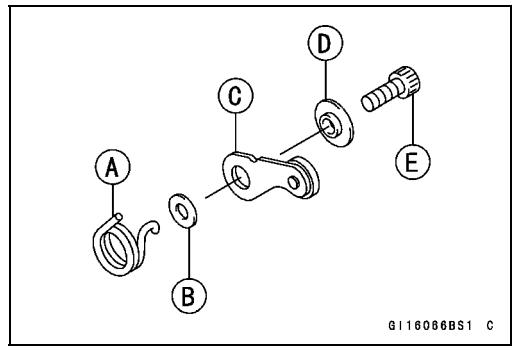


● Install:
Spring [A]
Washer [B]
Gear Positioning Lever [C]
Spacer [D]

● Apply a non-permanent locking agent to the threads of the gear positioning lever bolt [E], and tighten them.

Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

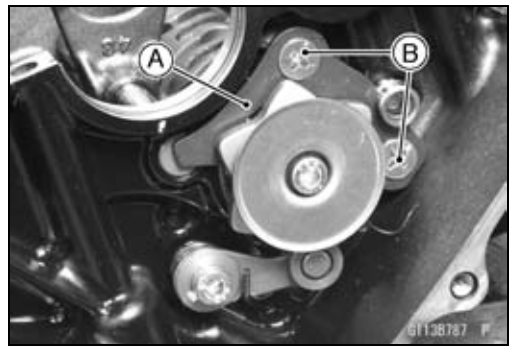
● Check the gear positioning lever and spring for smooth operation.



Transmission

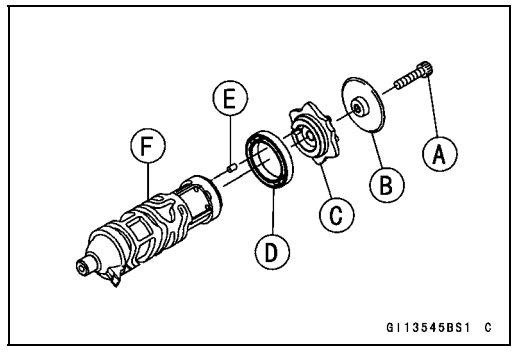
- Install the shift drum bearing holder [A].
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder screws [B], and tighten them.

Torque - Shift Drum Bearing Holder Screws: 4.4 N·m (0.45 kgf·m, 39 in·lb)



Shift Drum Disassembly

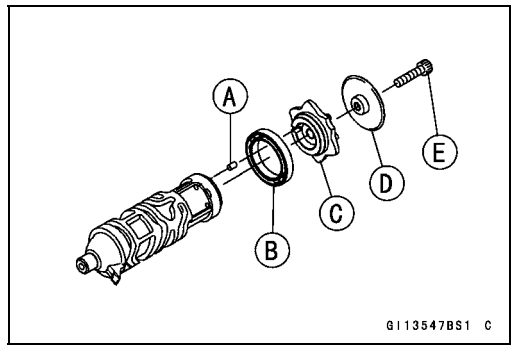
- Remove the shift drum (see Shift Drum and Fork Removal).
- While holding the shift drum with a vise, remove the shift drum cam bolt [A].
- Remove:
  Shift Drum Cam Holder [B]
  Shift Drum Cam [C]
  Shift Drum Bearing [D]
  Dowel Pin [E]
  Shift Drum [F]



Shift Drum Assembly

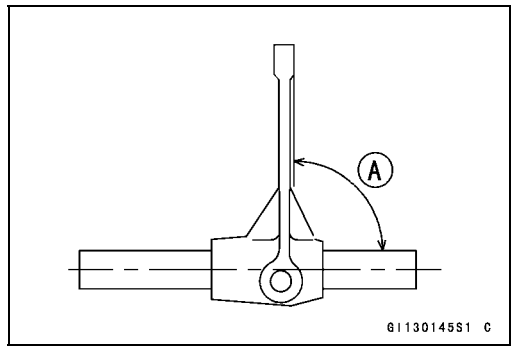
- Be sure to install the dowel pin [A].
- Install:
  Shift Drum Bearing [B]
  Shift Drum Cam [C]
  Shift Drum Cam Holder [D]
- Apply a non-permanent locking agent to the threads of the shift drum cam bolt [E], and tighten it.

Torque - Shift Drum Cam Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)



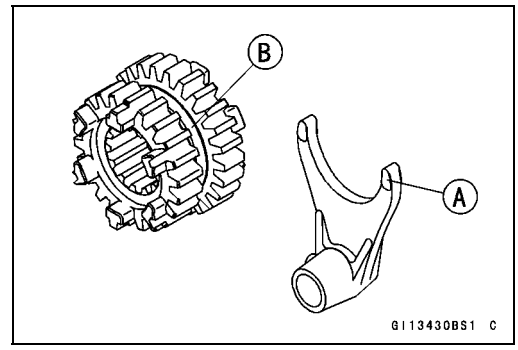
Shift Fork Bending Inspection

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
  90° [A]



Transmission

Shift Fork/Gear Groove Wear Inspection



- Measure the thickness of the shift fork ears [A], and measure the width of the gear grooves [B].

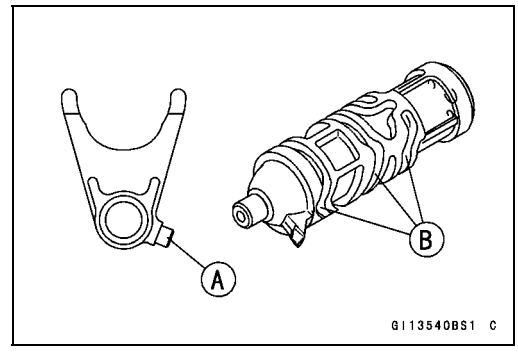
★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness
Standard: 4.9 ~ 5.0 mm (0.193 ~ 0.197 in.)
Service Limit: 4.8 mm (0.189 in.)

★If the gear groove is worn over the service limit, the gear must be replaced.

Gear Groove Width
Standard: 5.05 ~ 5.15 mm (0.199 ~ 0.203 in.)
Service Limit: 5.3 mm (0.209 in.)

Shift Fork Guide Pin/Drum Groove Wear Inspection



- Measure the diameter of each shift fork guide pin [A], and measure the width of each shift drum groove [B].

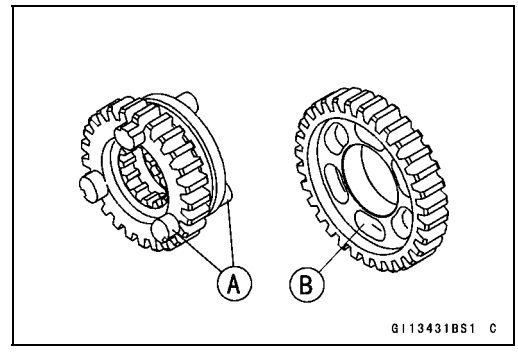
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter
Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)
Service Limit: 5.8 mm (0.228 in.)

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width
Standard: 6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)
Service Limit: 6.3 mm (0.248 in.)

Gear Dog and Gear Dog Hole Damage Inspection



- Visually inspect the gear dogs [A] and gear dog holes [B].

★Replace any damaged gears or gears with excessively worn dogs or dog holes.

Wheels/Tires

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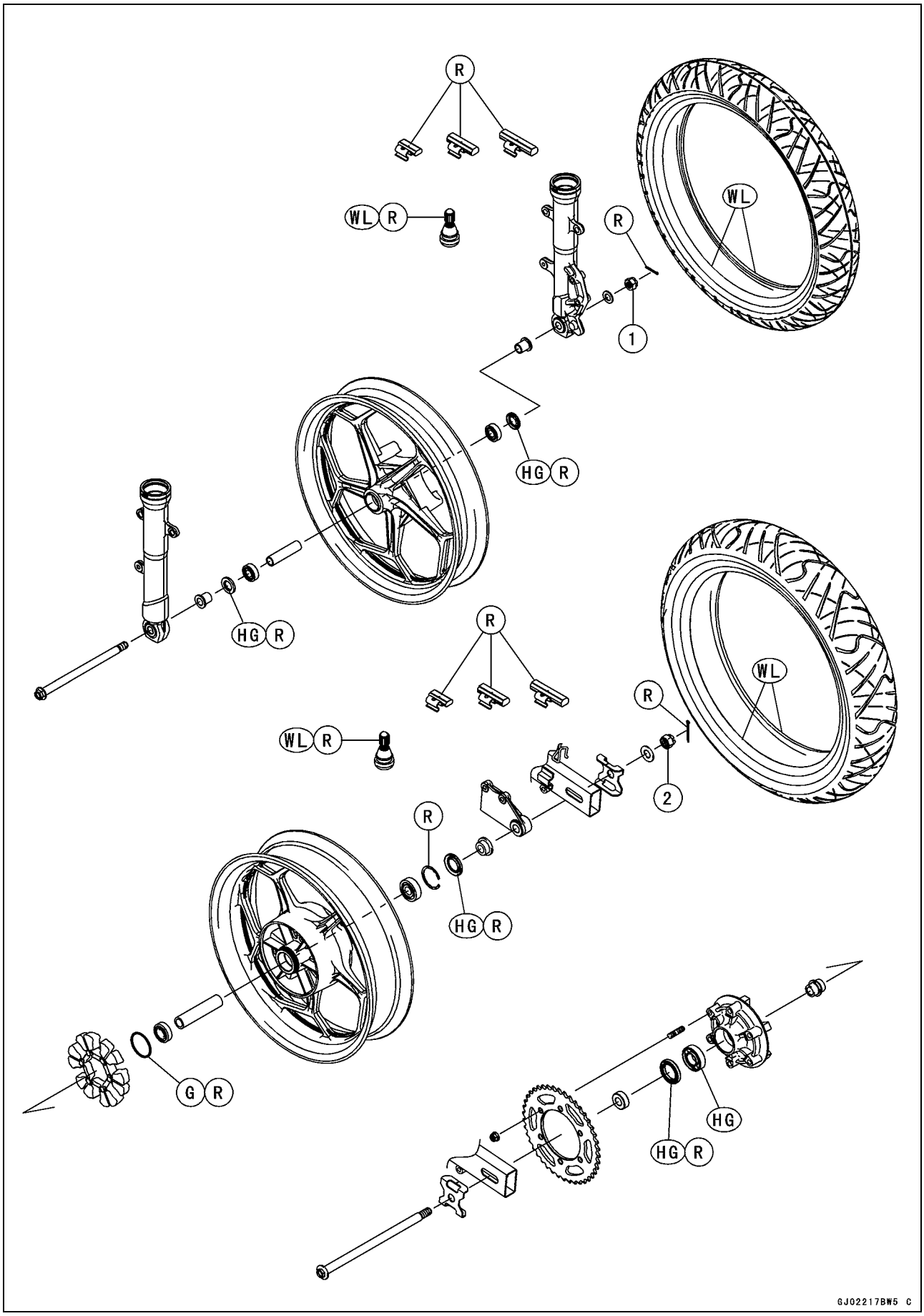
- Hub Bearing Lubrication 10-18

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Nut	88	9.0	65	
2	Rear Axle Nut	98	10.0	72	

G: Apply grease.
HG: Apply high-temperature grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

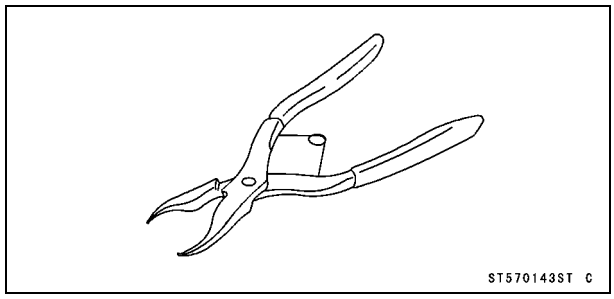
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.1 mm (0.004 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	– – –
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	– – –
Rim Size:		
Front	J17M/C × MT2.75	– – –
Rear	J17M/C × MT4.00	– – –
Tires		
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –
Tread Depth:		
Front	4.2 mm (0.17 in.)	1 mm (0.04 in.), (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	6.4 mm (0.25 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.), Over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tires:	Make, Type	Size
Front	IRC RX-01F TL	110/70-17M/C 54S
Rear	IRC RX-01R ZD TL	140/70-17M/C 66S

⚠ WARNING

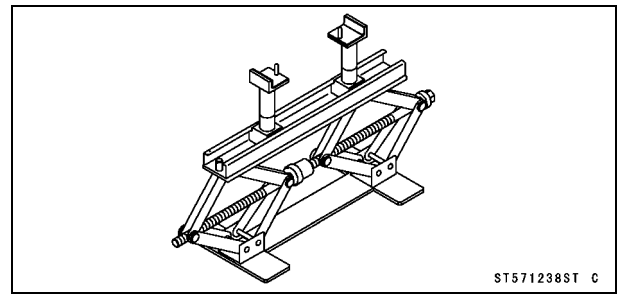
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

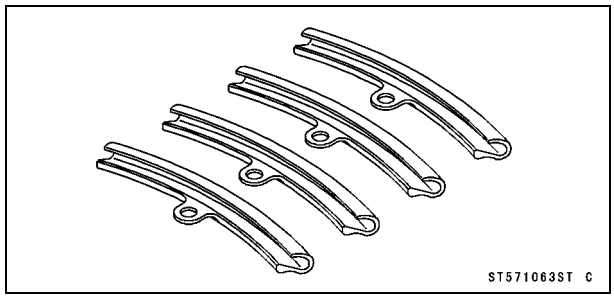
Inside Circlip Pliers:
57001-143



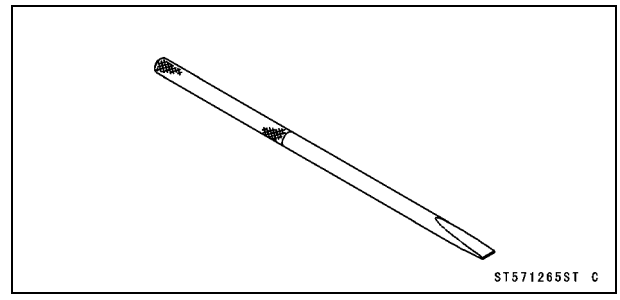
Jack:
57001-1238



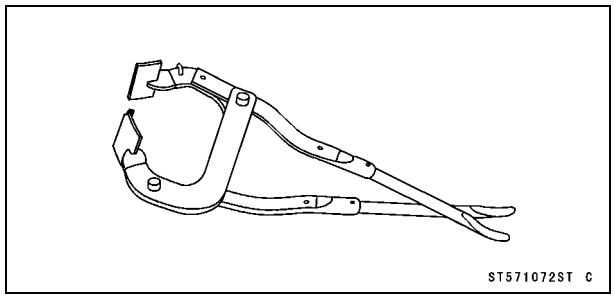
Rim Protector:
57001-1063



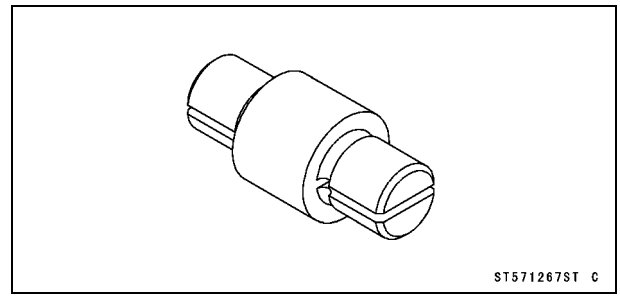
Bearing Remover Shaft, ϕ9:
57001-1265



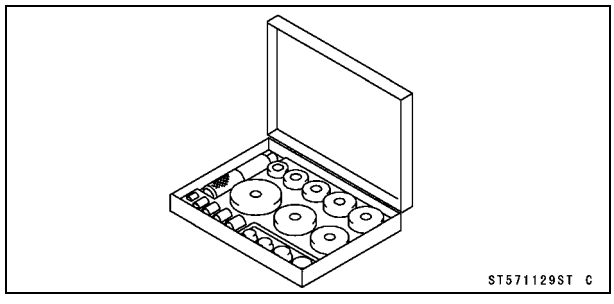
Bead Breaker Assembly:
57001-1072



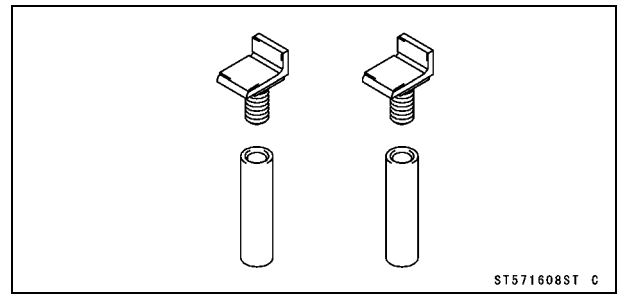
Bearing Remover Head, ϕ15 × ϕ17:
57001-1267



Bearing Driver Set:
57001-1129

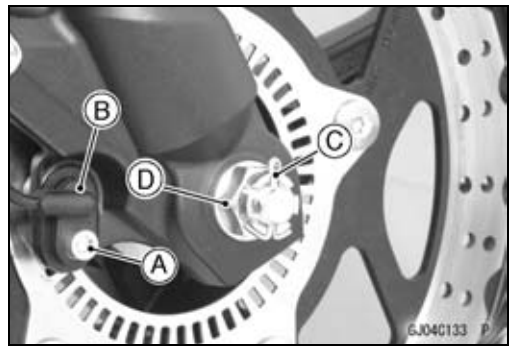


Jack Attachment:
57001-1608



Wheels (Rims)

Front Wheel Removal



- Remove:
  Front Caliper (see Front Caliper Removal in the Brakes chapter)
  Bolt [A] (ABS Equipped Models)
  Front Wheel Rotation Sensor [B] (ABS Equipped Models)
  Cotter Pin [C]
  Axle Nut [D] and Washer
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
- Raise the front wheel off the ground with the jack.

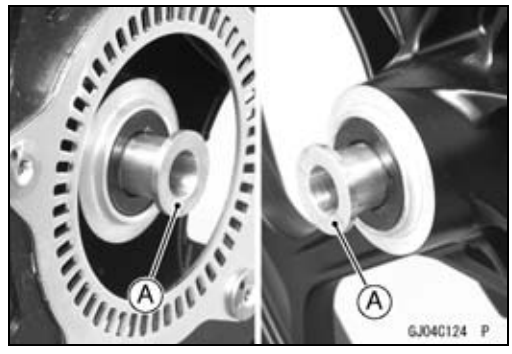
Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- Pull out the axle to the left and remove the front wheel from the forks.

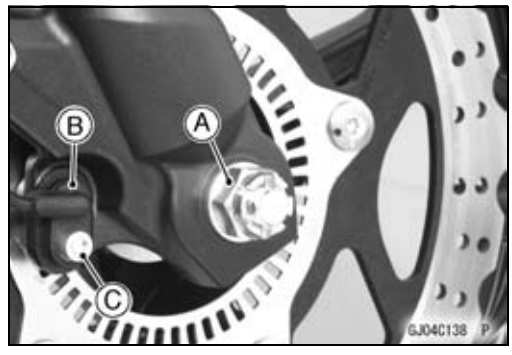
NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation



- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.



- Insert the front axle from the left side, and install the washer and axle nut [A].
- Tighten:

Torque - Front Axle Nut: 88 N·m (9.0 kgf·m, 65 ft·lb)

- Install the front wheel rotation sensor [B] and tighten the bolt [C] (ABS Equipped Models).

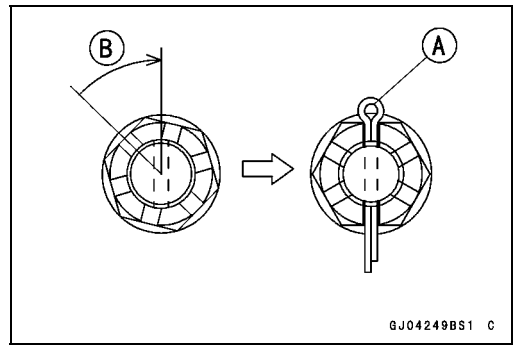
Torque - Front Wheel Rotation Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Wheels (Rims)

● Insert a new cotter pin [A].

NOTE

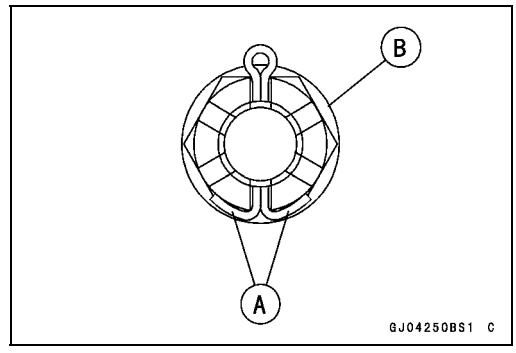
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degrees.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



● Bend the cotter pin [A] over the nut [B].

⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.



● Install the removed parts (see appropriate chapters).
● Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

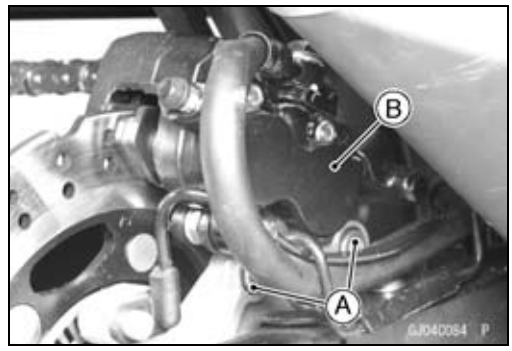
After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Rear Wheel Removal

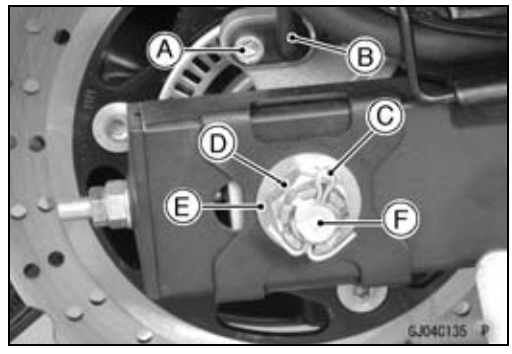
● Raise the rear wheel off the ground with the stand [A].

Wheels (Rims)

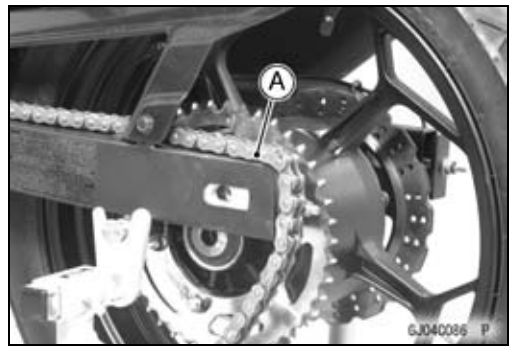
- Remove the rear caliper mounting bolts [A].
- Turn the rear caliper [B] rearward to take off from the rear brake disc.



- Remove the bolt [A] and rear wheel rotation sensor [B] (ABS Equipped Models).
- Remove:
  Cotter Pin [C]
  Axle Nut [D]
  Washer [E]
  Axle [F] (from Left Side)



- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.

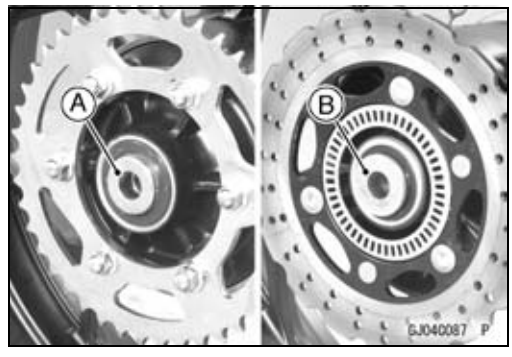


NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collars on the both sides of the hub.
  Left Side Collar [A]
  Right Side Collar [B] (with Flange)

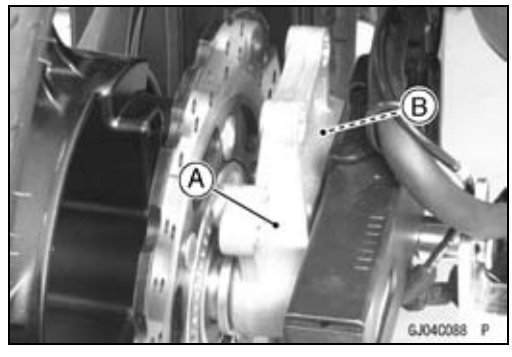


- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the swingarm stop [B].
- Insert the axle from the left side of the wheel, and tighten the axle nut.

Torque - Rear Axle Nut: 98 N·m (10.0 kgf·m, 72 ft·lb)

- Install the rear wheel rotation sensor and tighten the bolt (ABS Equipped Models).

Torque - Rear Wheel Rotation Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

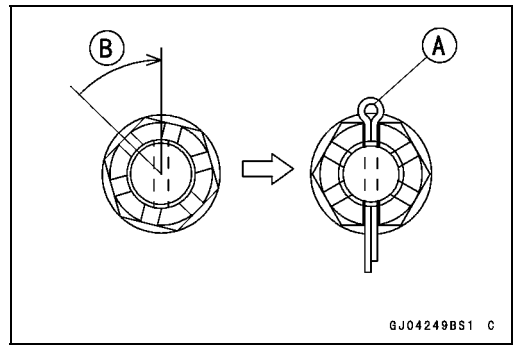


Wheels (Rims)

- Insert a new cotter pin [A].

NOTE

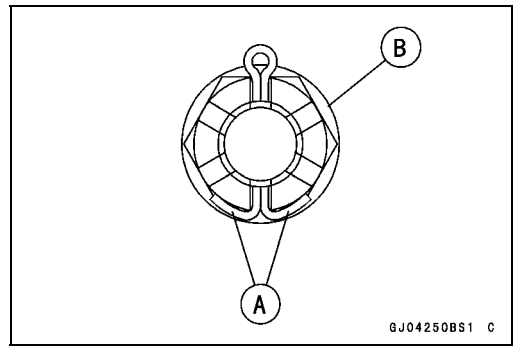
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degrees.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



- Bend the cotter pin [A] over the nut [B].

⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.



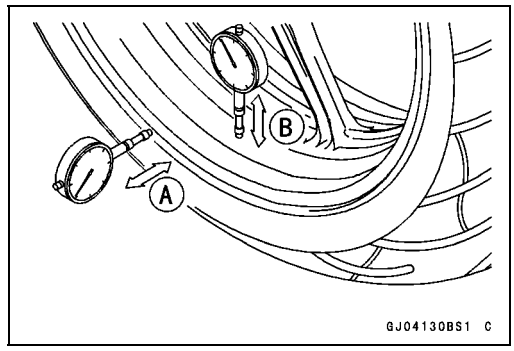
- Adjust the drive chain slack after installation (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Install the rear caliper (see Caliper Installation in the Brakes chapter).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Wheels (Rims)

Wheel Inspection



- Raise the front/rear wheel off the ground.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- Spin the wheel lightly, and check for roughness or binding.

★If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).

- Inspect the wheel for small cracks, dents, bending, or warp.

★If there is any damage to the wheel, replace the wheel.

- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.

★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).

★If the problem is not due to the bearings, replace the wheel.

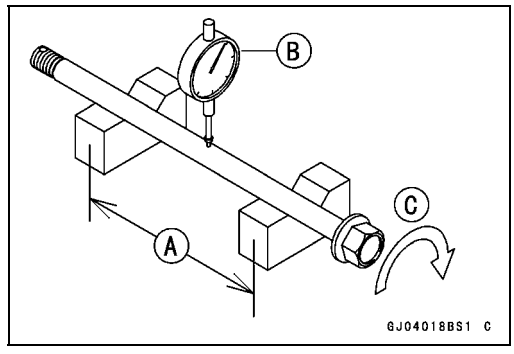
Rim Runout (with tire installed)

Standard:	
Axial	**TIR 0.5 mm (0.02 in.) or less**
Radial	**TIR 0.8 mm (0.03 in.) or less**
Service Limit:	
Axial	**TIR 1.0 mm (0.04 in.)**
Radial	**TIR 1.0 mm (0.04 in.)**

⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Axle Inspection



- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.

★If the axle is damaged or bent, replace it.

- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

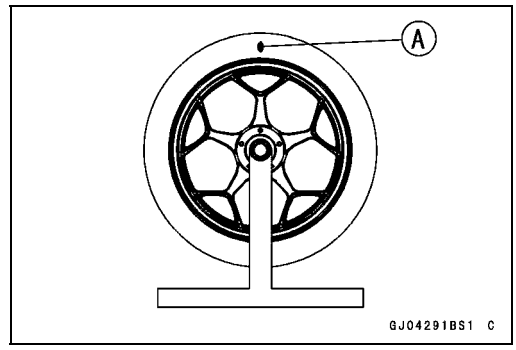
★If axle runout exceeds the service limit, replace the axle.

Axle Runout/100 mm (3.94 in.)

Standard:	**TIR 0.1 mm (0.004 in.) or less**
Service Limit:	**TIR 0.2 mm (0.008 in.)**

Wheels (Rims)

Balance Inspection

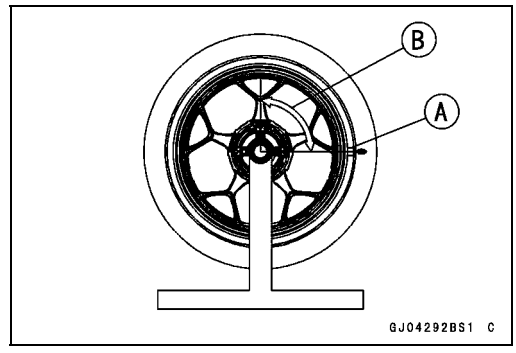


- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment).

Balance Adjustment

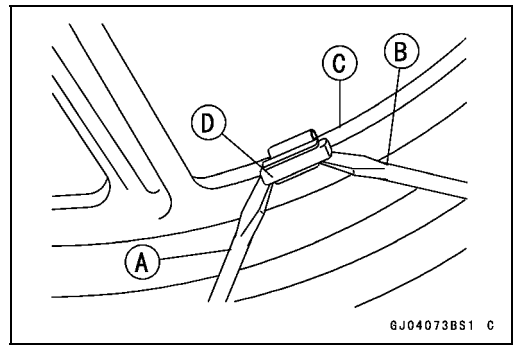


- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.

Balance Weight Removal

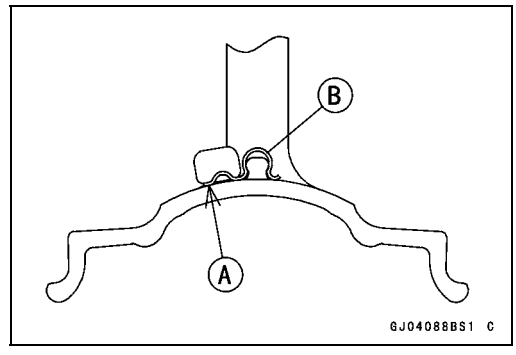


- Insert a standard tip screwdrivers [A] [B] between the rib [C] and the weight [D].
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

NOTICE

Do not tap the screwdrivers. The rim could be damaged.

Balance Weight Installation



- Check if the weight portion has any play on the blade [A] and clip [B].

★If it does, discard it.

⚠ WARNING

Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

Wheels (Rims)

Balance Weight

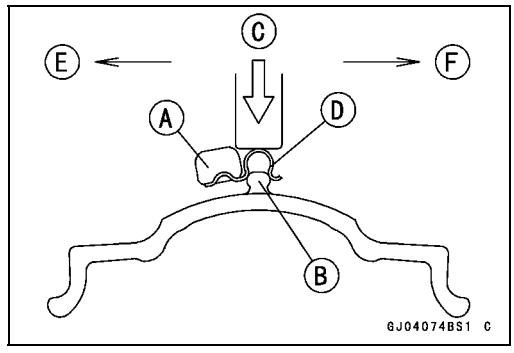
Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

NOTE

○*Balance weights are available from Kawasaki dealers in 10, 20, and 30 grams (0.35, 0.71, and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.*

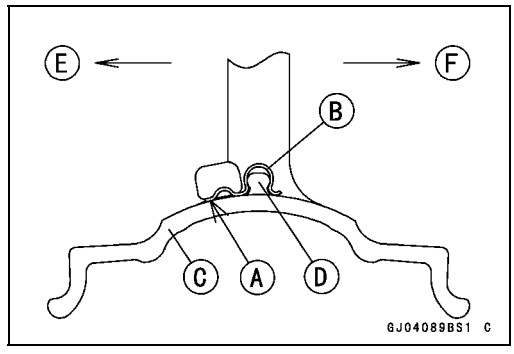
○*Do not use four or more balance weight (more than 90 gram, 3.17 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

● Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
Left Side [E]
Right Side [F]



● Be sure to install the balance weight.

○Check that the blade [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].
Left Side [E]
Right Side [F]



Tires

Air Pressure Inspection/Adjustment

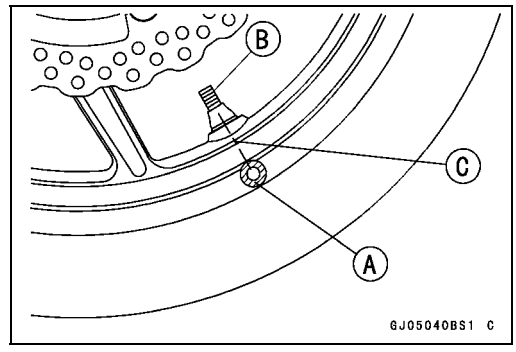
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

Tire Inspection

- Refer to the Wheel/Tire Damage Inspection in the Periodic Maintenance chapter.

Tire Removal

- Remove:
  Wheels (see Front/Rear Wheel Removal)
  Valve Core (Let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
  Chalk Mark or Yellow Mark [A]
  Air Valve [B]
  Align [C]

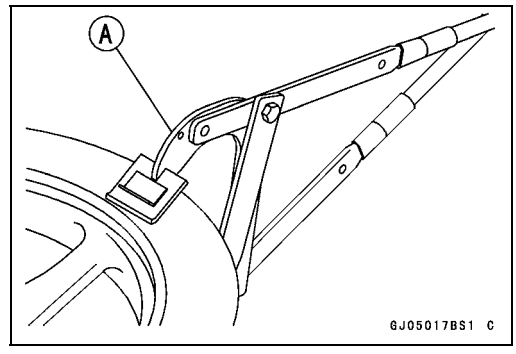


- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

NOTICE
Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

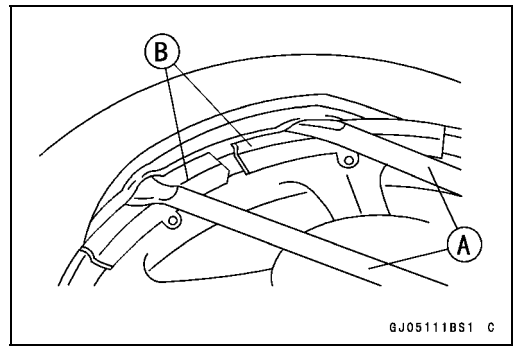
- Break the beads away from both sides of the rim with the bead breaker [A].

  Special Tool - Bead Breaker Assembly: 57001-1072



- Step on the side of the tire opposite the valve stem and start prying the tire off the rim near the air valve with tire irons [A].

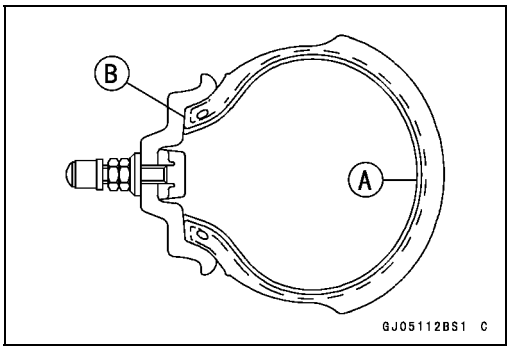
  Special Tools - Rim Protector [B]: 57001-1063
  Bead Breaker Assembly: 57001-1072



Tires

NOTE

○*For easier removal, always position the tire bead opposite the valve stem in the rim well, and pry the tire bead a little at a time.*



NOTICE

Be careful not to scratch the inner liner [A] and air sealing surfaces [B] of the rim and tire with the tire irons. A scratched inner liner or sealing surface may allow air to leak.

- After removing the bead on one side, remove the other bead from the same manner.
- Remove the tire from the rim.

Tire Installation

⚠ WARNING

Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

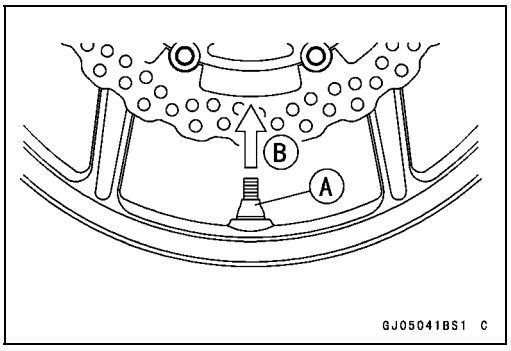
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

- Install a new valve in the rim.

○Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

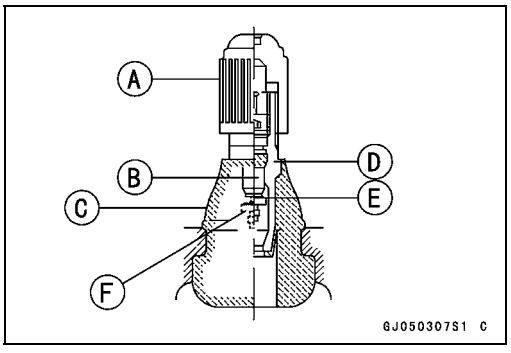


NOTICE

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

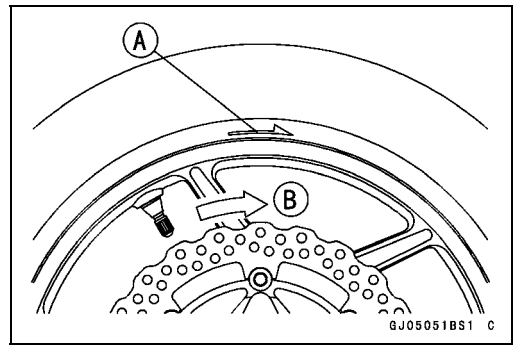
○The air valve is as shown.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

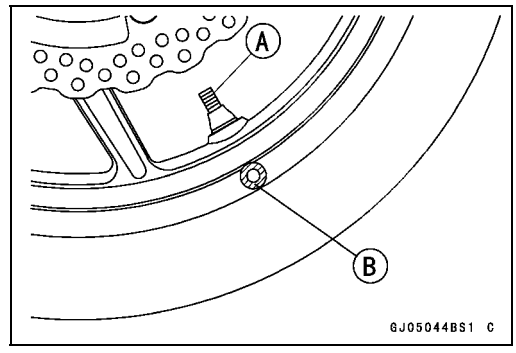


Tires

- Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.
  Tire Rotation Mark [A]
  Rotating Direction [B]



- Position the tire on the rim so that the air valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).



- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve stem.
- Fit the rim protectors and tire irons to install the remaining part of the tire bead which cannot be installed by hand. For easy tire installation, position the parts of the bead which is already over the rim flange in the rim well.

NOTE

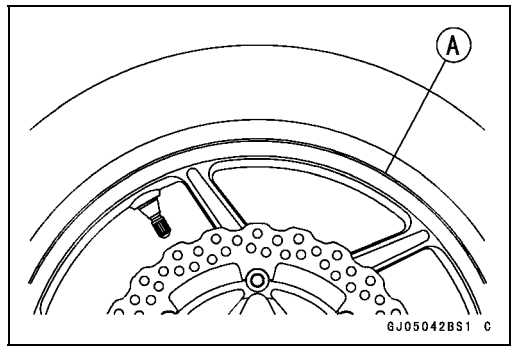
○*To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.*

- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).

Tires



- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).

Tire Repair

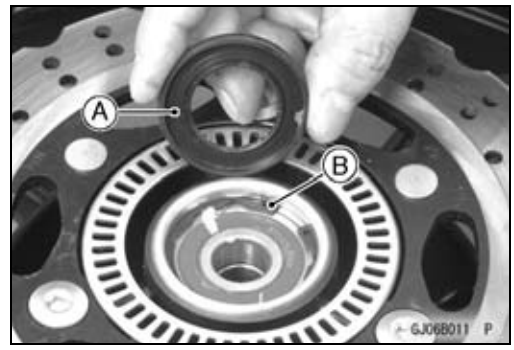
Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

Hub Bearing Removal

- Remove the wheels (see Front/Rear Wheel Removal).
- Remove:
  Collars
  Coupling (Out of rear hub)
  Grease Seals [A]
  Circlip [B] (For Rear Wheel)

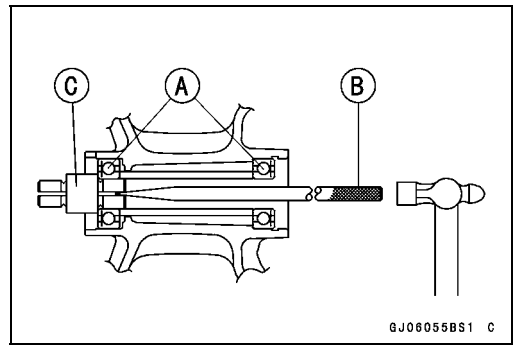
Special Tool - Inside Circlip Pliers: 57001-143



- Use the bearing remover to remove the hub bearings [A].

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



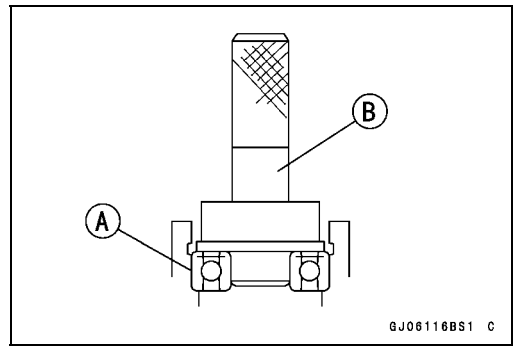
Special Tools - Bearing Remover Shaft, ϕ9 [B]: 57001-1265
Bearing Remover Head, ϕ15 × ϕ17 [C]: 57001-1267

Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.

NOTE

○*Install the front hub bearings with theirs sealed sides face out.*



- By the following specified sequence, install the bearings.

○Press in the right side bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

○Install the collar into the hub from left side.

○Press in the left side bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

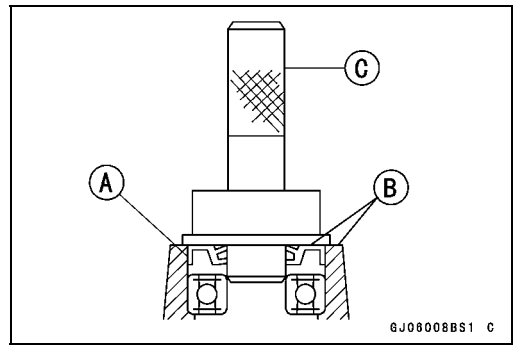
- Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers: 57001-143

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

○Apply high-temperature grease to the grease seal lips.

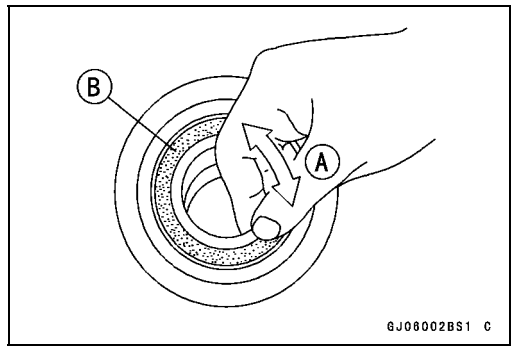
Special Tool - Bearing Driver Set [C]: 57001-1129



Hub Bearing

Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.



NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Hub Bearing Lubrication

NOTE

○*When replacing the front hub bearing, pack grease to the new hub bearing from the non-sealed side.*

Final Drive

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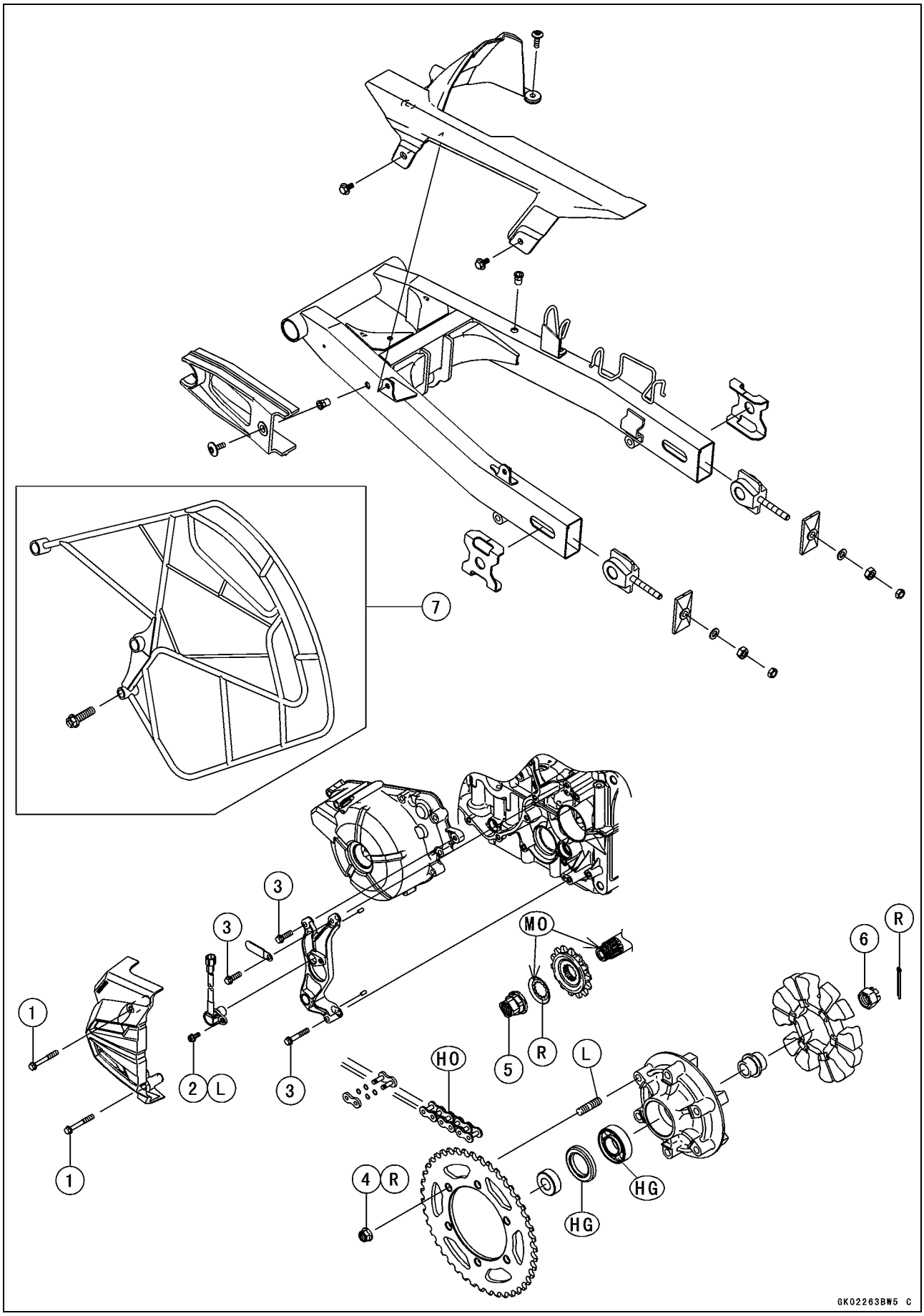
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
2	Speed Sensor Bolt	7.8	0.80	69 in·lb	L
3	Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
4	Rear Sprocket Nuts	59	6.0	44	R
5	Engine Sprocket Nut	127	13.0	93.7	MO
6	Rear Axle Nut	98	10.0	72	

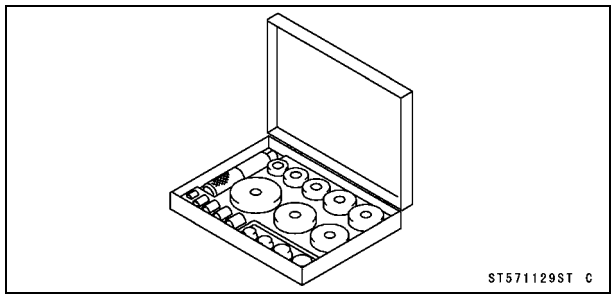
7. IN Model
HG: Apply high-temperature grease.
HO: Apply heavy oil.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts

Specifications

Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.56 in.)
Standard Chain:		
Make	ENUMA	– – –
	L.G.B. (when shipping)	– – –
	DAIDO (when shipping) (BR Model)	– – –
Type	EK520SRO	– – –
	R520HPXR (when shipping)	– – –
	DID 520VD2 (when shipping) (BR Model)	– – –
Link	106 links	– – –
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tool

Bearing Driver Set:
57001-1129



Drive Chain

Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Drive Chain Slack Adjustment

- Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

Wheel Alignment Inspection/Adjustment

- Refer to the Wheel Alignment Inspection in the Periodic Maintenance chapter.

Drive Chain Wear Inspection

- Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Lubrication

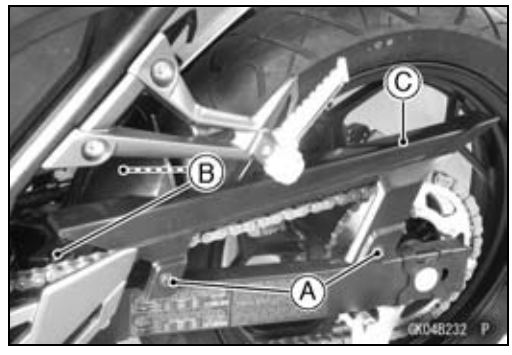
- Refer to the Drive Chain Lubrication Condition in the Periodic Maintenance chapter.

Drive Chain Guide Wear Inspection

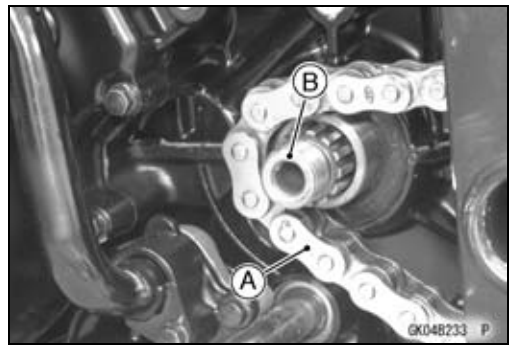
- Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Removal

- Remove:
  Chain Cover Bolts [A]
  Chain Cover Bolts [B]
  Saree Guard Bolt (IN Model)
  Saree Guard (IN Model)
  Chain Cover [C]
  Engine Sprocket (see Engine Sprocket Removal)
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Swingarm (see Swingarm Removal in the Suspension chapter)



- Remove the drive chain [A] from the output shaft [B], and take it off the chassis.



Drive Chain

Drive Chain Installation

- Install the drive chain to the output shaft.
- Install:
  Swingarm (see Swingarm Installation in the Suspension chapter)
  Rear Wheel (see Rear Wheel Installation in the Wheels/Tires chapter)
  Engine Sprocket (see Engine Sprocket Installation)
  Chain Cover
  Saree Guard (IN Model)
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Drive Chain Replacement (EK520SRO)

- Remove:
  Chain Cover (see Drive Chain Removal)
  Engine Sprocket Cover (see Engine Sprocket Removal)

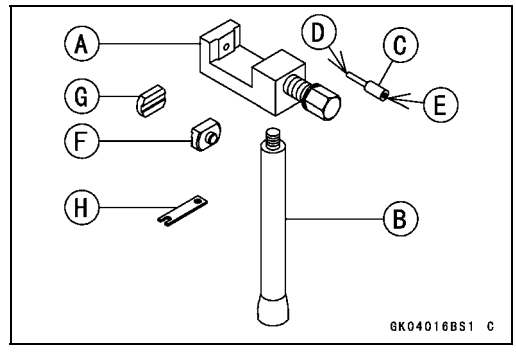
NOTICE

For safety, if the drive chain shall be replaced, replace it using a recommended tool.

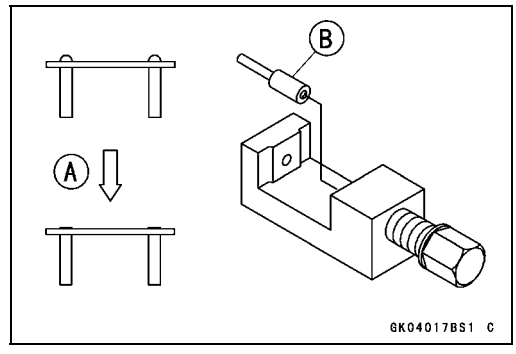
Recommended Tool

Type:	**EK Joint Tool #50**
Brand:	**ENUMA**

Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]

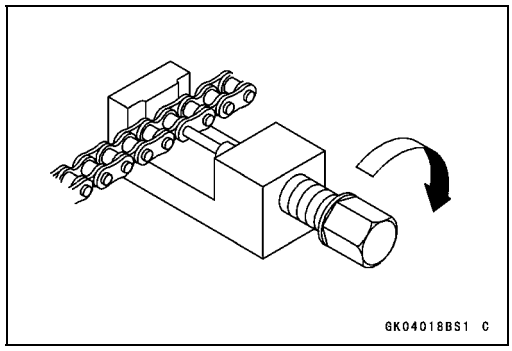


- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown.

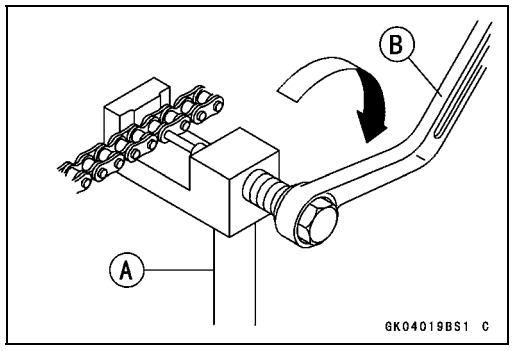


Drive Chain

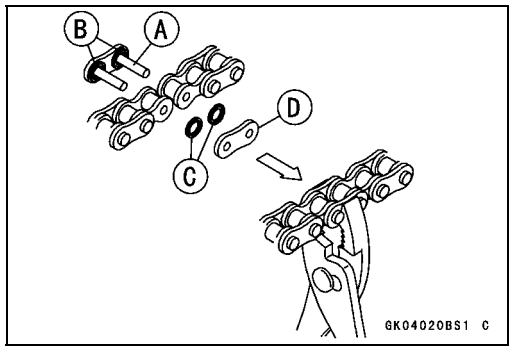
- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.



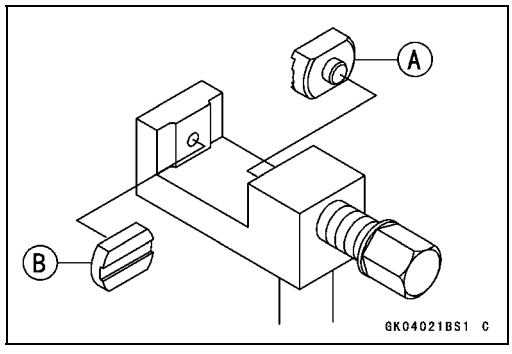
- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.



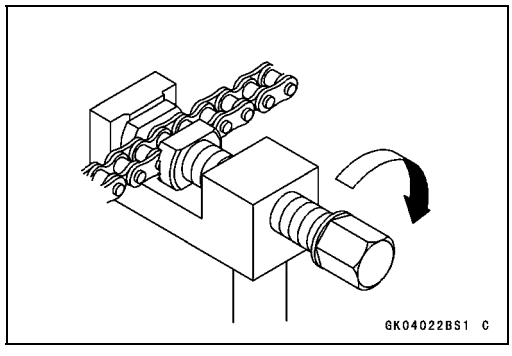
- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.



- Set the plate holder (A) [A] and plate holder (B) [B] on the body.

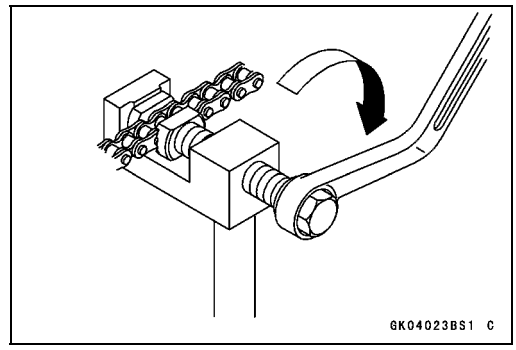


- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.

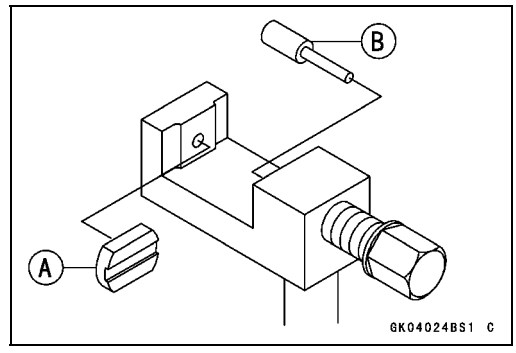


Drive Chain

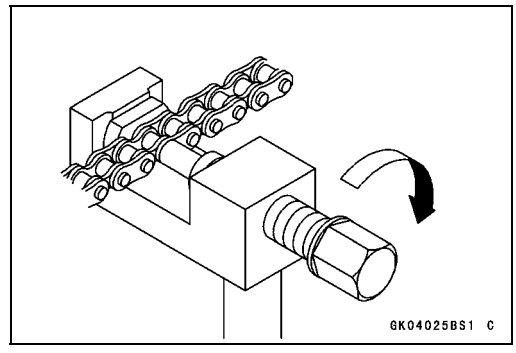
- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



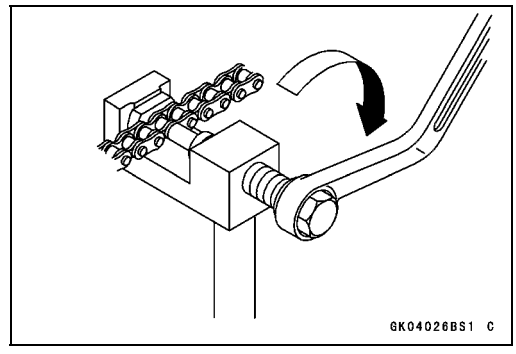
- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown.



- Turn the pin holder until the riveting pin touches the link pin.



- Turn the wrench clockwise until the tip of riveting pin hits of the link pin.
- Rivet it.
- Same work for the other link pin.

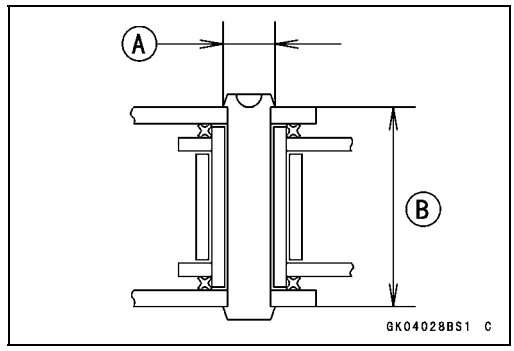


Drive Chain

- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

Link Pin Outside Diameter
Standard: 5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)

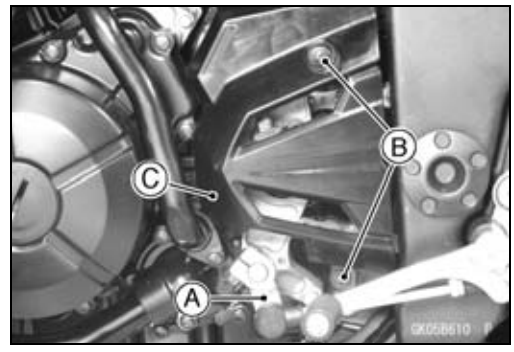
Link Plates Outside Width
Standard: 17.35 ~ 17.50 mm (0.683 ~ 0.689 in.)



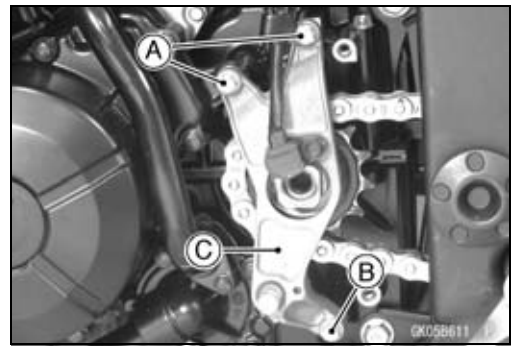
★If the reading exceeds the specified length, cut and rejoin the chain again.
- Check the movement of the rollers.
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Sprocket, Coupling

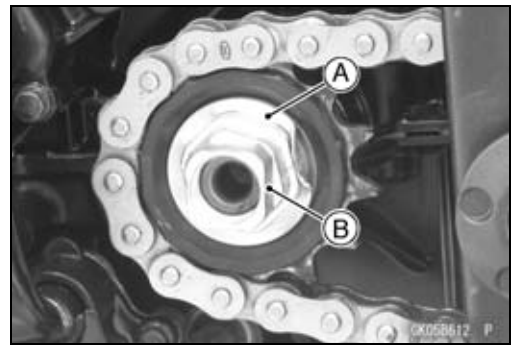
Engine Sprocket Removal



- Remove:
  Shift Lever [A] (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  Engine Sprocket Cover Bolts [B]
  Engine Sprocket Cover [C]



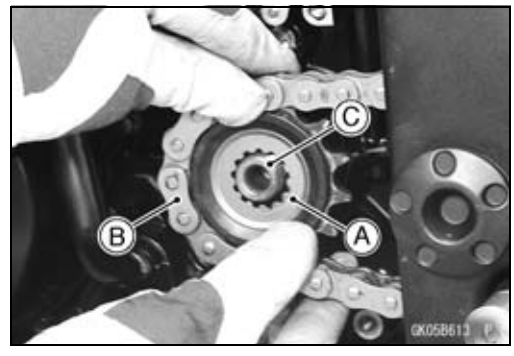
- Remove the speed sensor mounting bracket upper bolts [A] and lower bolt [B].
- Remove the speed sensor mounting bracket [C] and dowel pins.



- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

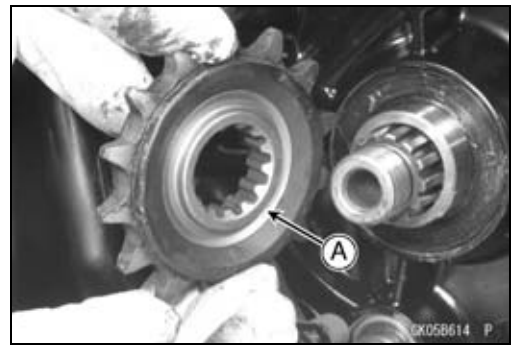
NOTE

○*When loosening the engine sprocket nut, hold the rear brake on.*



- Raise the rear wheel off the ground with the stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.

Engine Sprocket Installation



- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket so that protruding side [A] faces inside.
- Apply molybdenum disulfide oil solution to the threads of output shaft and the surface of washer.
- Tighten:

Torque - Engine Sprocket Nut: 127 N·m (13.0 kgf·m, 93.7 ft·lb)

NOTE

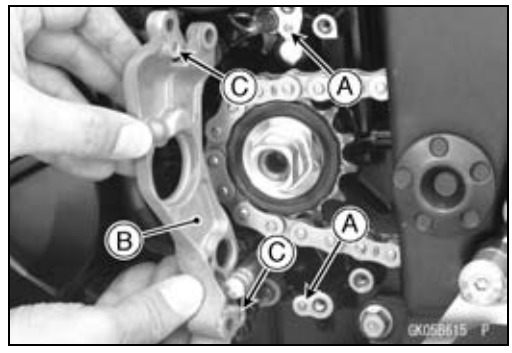
○*Tighten the nut while applying the rear brake.*

- Bend the one side of the washer over the nut.

Sprocket, Coupling

- Install the dowel pins [A].
- Install the speed sensor bracket [B] so that the dowel pins fits into the holes [C] of the speed sensor bracket.
- Tighten:

Torque - Speed Sensor Bracket Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Run the speed sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the engine sprocket cover.
- Tighten:

Torque - Engine Sprocket Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

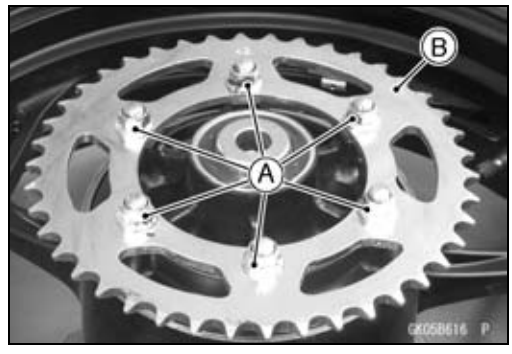
- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

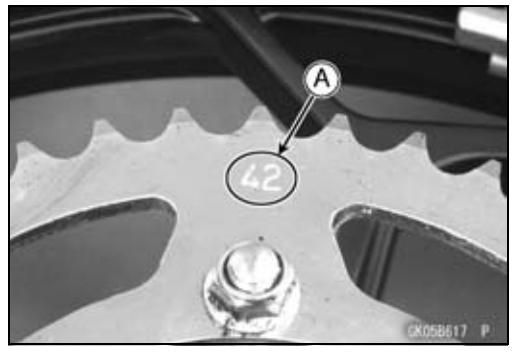


- Remove:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]

Rear Sprocket Installation

- Install the sprocket facing the tooth number marking [A] outward.
- Replace the rear sprocket nuts with new ones.
- Tighten:

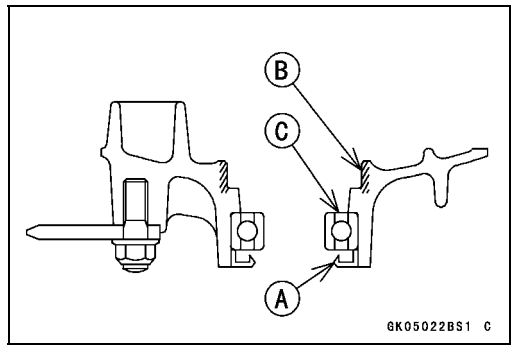
Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)



- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).

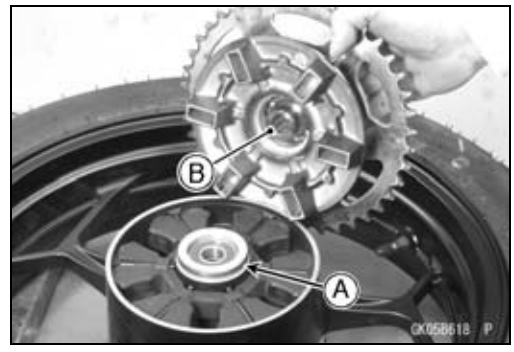
Coupling Installation

- Apply grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [B]
  Ball Bearing [C]



Sprocket, Coupling

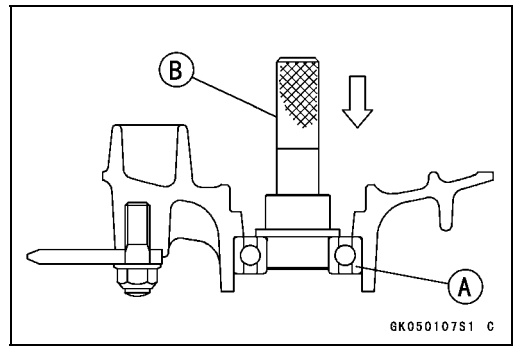
- Replace the O-ring [A] with a new one and apply grease to it.
- Install:
  O-ring
  Collar [B]
  Coupling



Coupling Bearing Removal

- Remove:
  Coupling
  Grease Seal
- Remove the bearing [A] by tapping from the wheel side.

Special Tool - Bearing Driver Set [B]: 57001-1129

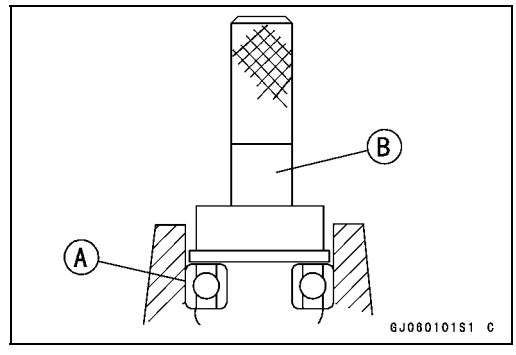


Coupling Bearing Installation

- Replace the bearing with a new one.
- Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

○Pack the bearing with high-temperature grease.



- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.

○Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129

Coupling Bearing Inspection

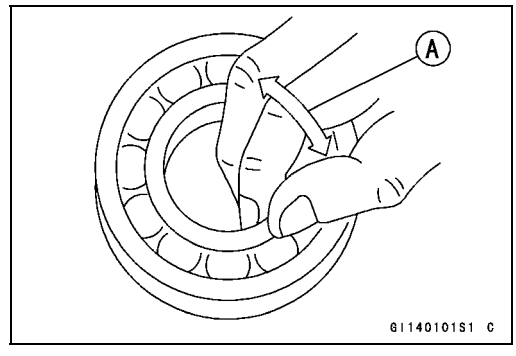
Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.*

- Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding.

★If the bearing play, roughness or binding is found, replace the bearing.



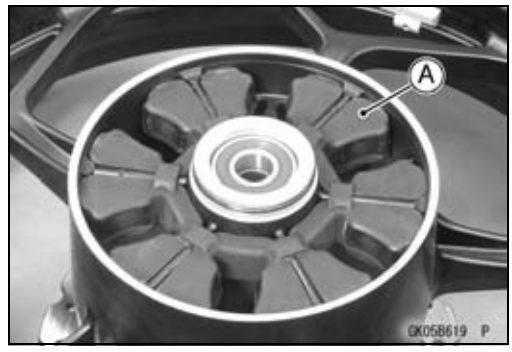
Sprocket, Coupling

Coupling Bearing Lubrication

- Pack the bearing with grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

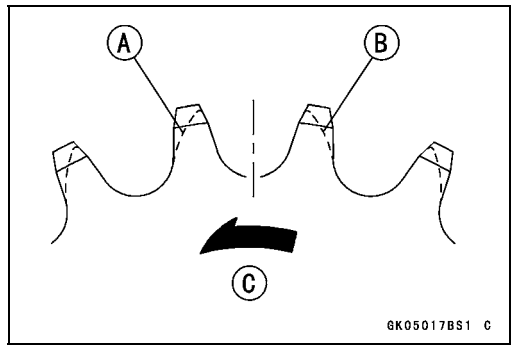


Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.

★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).

Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]



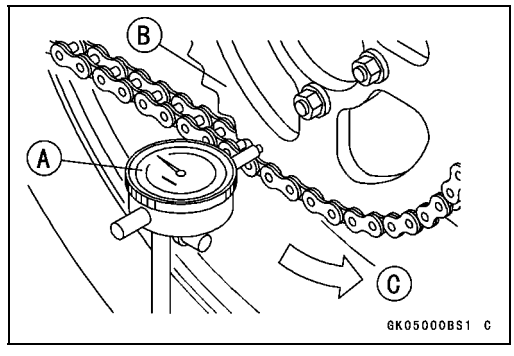
NOTE

○*If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.*

Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

★If the runout exceeds the service limit, replace the rear sprocket.



Rear Sprocket Warp

Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

Brakes

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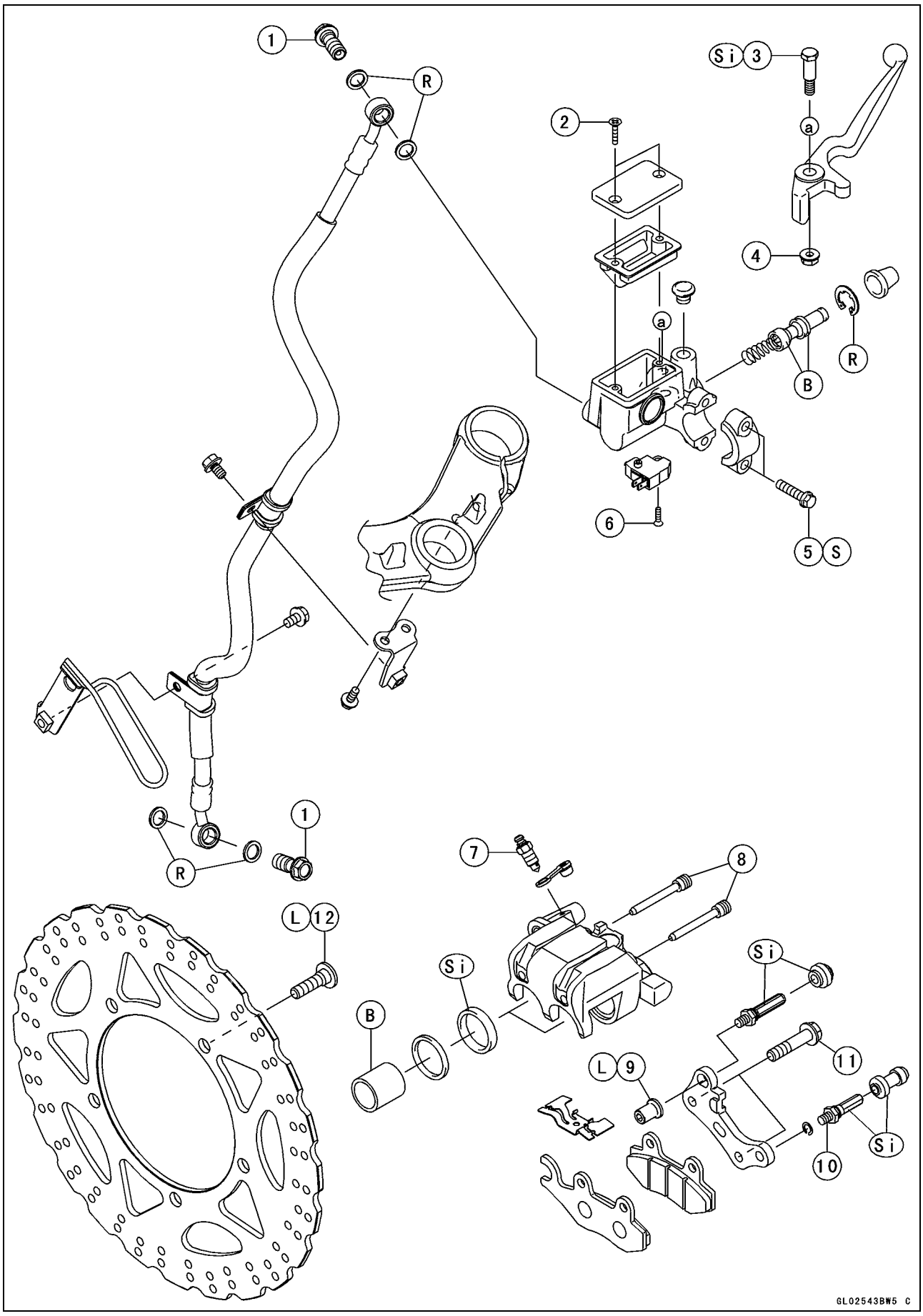
Exploded View

EX300A Model



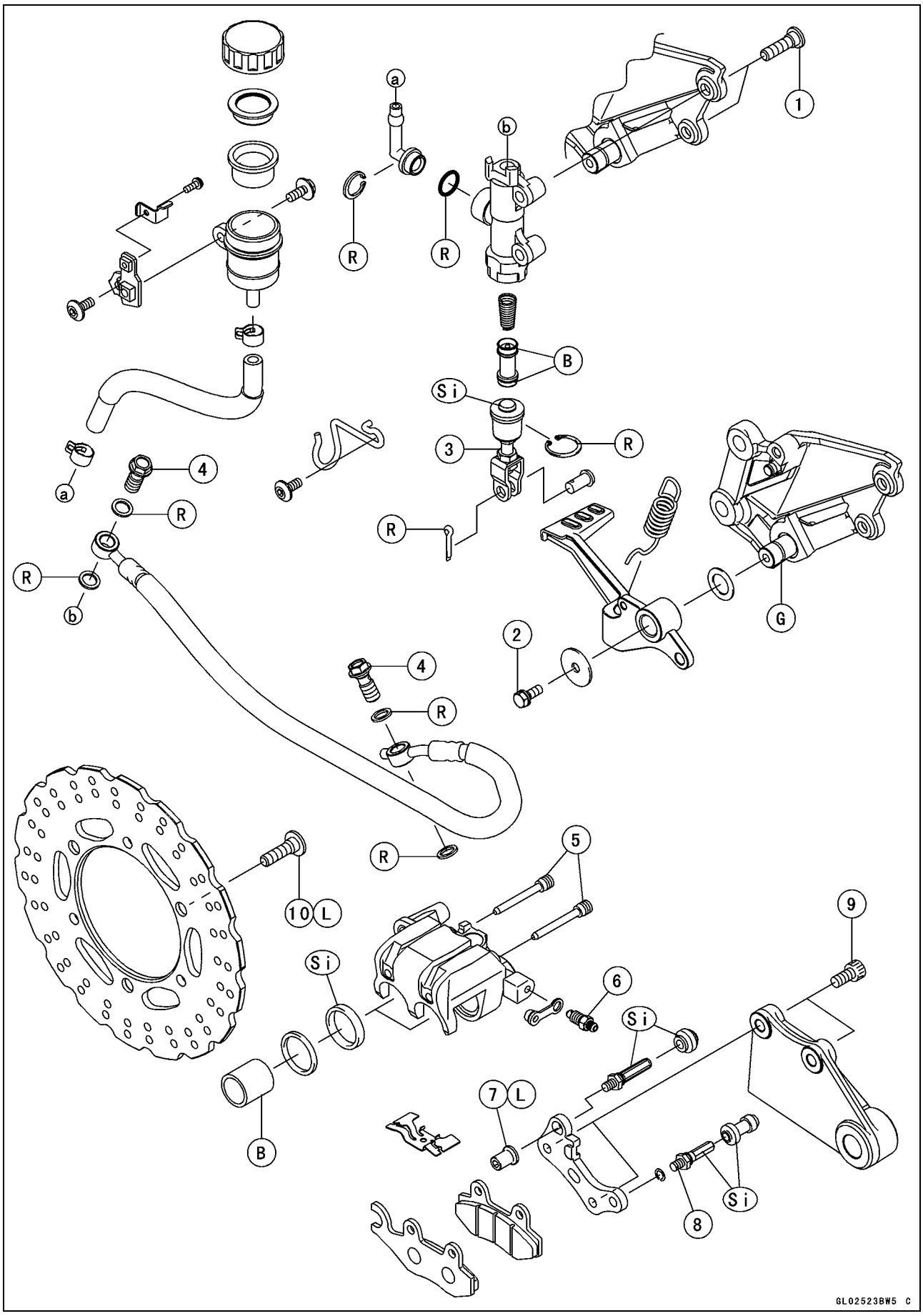
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Bleed Valve	5.5	0.56	49 in·lb	
8	Front Brake Pad Pins	17.2	1.75	12.7	
9	Front Caliper Holder Pin Nut	22	2.2	16	L
10	Front Caliper Holder Pin	17.2	1.75	12.7	Si
11	Front Caliper Mounting Bolts	25	2.5	18	
12	Front Brake Disc Mounting Bolts	27	2.8	20	L

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease (ex. PBC grease).

Exploded View

EX300A Model



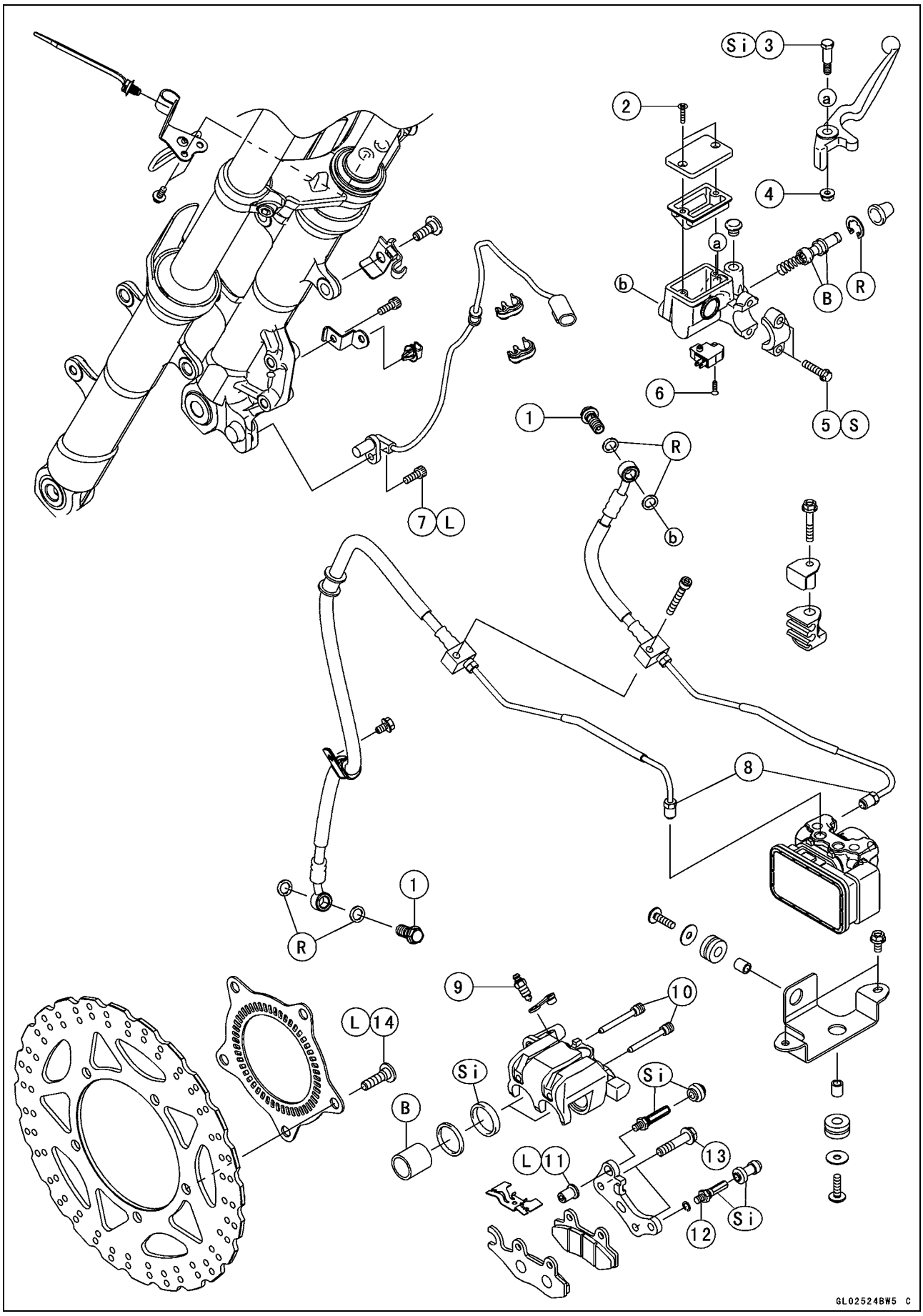
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Master Cylinder Mounting Bolts	25	2.5	18	
2	Brake Pedal Bolt	8.8	0.90	78 in·lb	
3	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
4	Brake Hose Banjo Bolts	25	2.5	18	
5	Rear Brake Pad Pins	17.2	1.75	12.7	
6	Bleed Valve	5.5	0.56	49 in·lb	
7	Rear Caliper Holder Pin Nut	22	2.2	16	L
8	Rear Caliper Holder Pin	17.2	1.75	12.7	Si
9	Rear Caliper Mounting Bolts	25	2.5	18	
10	Rear Brake Disc Mounting Bolts	27	2.8	20	L

B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease (ex. PBC grease).

Exploded View

EX300B Model



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Front Wheel Rotation Sensor Bolt	9.8	1.0	87 in·lb	L
8	Brake Pipe Joint Nuts	18	1.8	13	
9	Bleed Valve	5.5	0.56	49 in·lb	
10	Front Brake Pad Pins	17.2	1.75	12.7	
11	Front Caliper Holder Pin Nut	22	2.2	16	L
12	Front Caliper Holder Pin	17.2	1.75	12.7	Si
13	Front Caliper Mounting Bolts	25	2.5	18	
14	Front Brake Disc Mounting Bolts	27	2.8	20	L

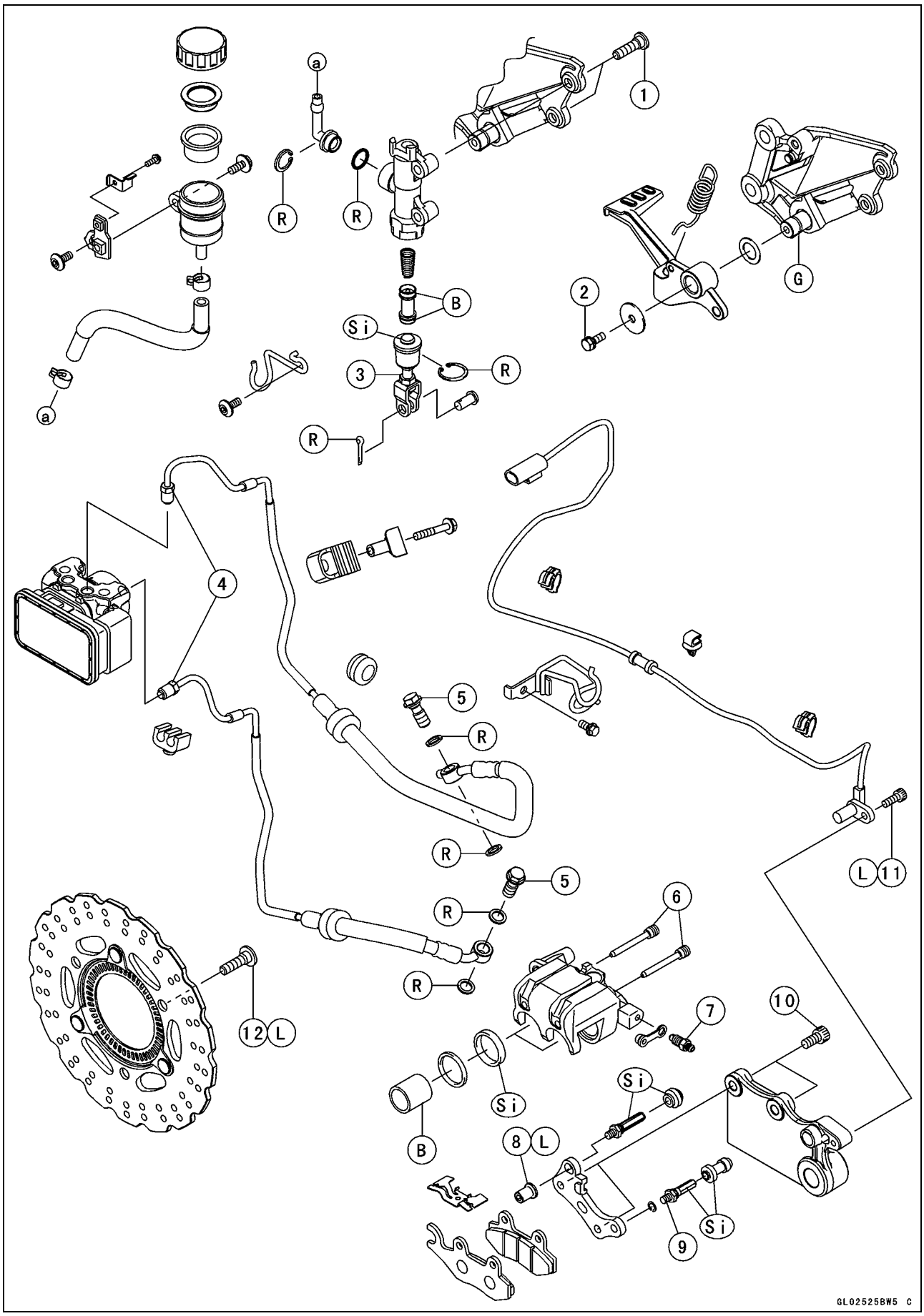
B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease (ex. PBC grease).

NOTE

○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Exploded View

EX300B Model



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Master Cylinder Mounting Bolts	25	2.5	18	
2	Brake Pedal Bolt	8.8	0.90	78 in·lb	
3	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
4	Brake Pipe Joint Nuts	18	1.8	13	
5	Brake Hose Banjo Bolts	25	2.5	18	
6	Rear Brake Pad Pins	17.2	1.75	12.7	
7	Bleed Valve	5.5	0.56	49 in·lb	
8	Rear Caliper Holder Pin Nut	22	2.2	16	L
9	Rear Caliper Holder Pin	17.2	1.75	12.7	Si
10	Rear Caliper Mounting Bolts	25	2.5	18	
11	Rear Wheel Rotation Sensor Bolt	9.8	1.0	87 in·lb	L
12	Rear Brake Disc Mounting Bolts	27	2.8	20	L

B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease (ex. PBC grease).

NOTE

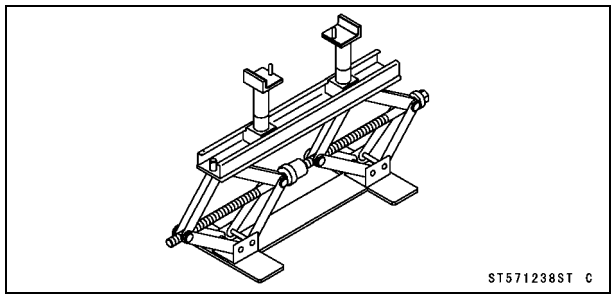
○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Specifications

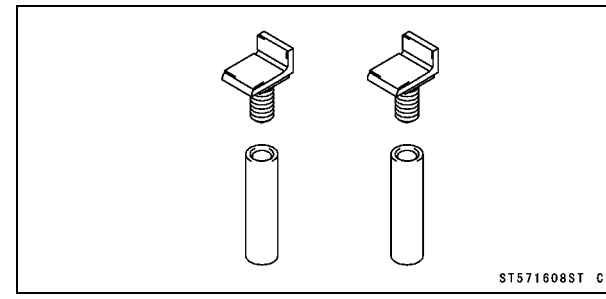
Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	Non-adjustable	– – –
Brake Lever Free Play	Non-adjustable	– – –
Pedal Free Play	Non-adjustable	– – –
Pedal Position	About 40 mm (1.57 in.) below top of footpeg	– – –
Brake Pads		
Lining Thickness:		
Front (EX300A Model)	4.5 mm (0.18 in.)	1.5 mm (0.06 in.)
Front (EX300B Model)	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1.5 mm (0.06 in.)
Brake Discs		
Thickness:		
Front	4.3 ~ 4.7 mm (0.17 ~ 0.19 in.)	4.0 mm (0.16 in.)
Rear	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Runout	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Brake Fluid		
Grade:		
Front	DOT3 or DOT4	– – –
Rear	DOT4	– – –
ABS (Equipped Models)		
Wheel Rotation Sensor Air Gap:		
Front	0.1 ~ 1.5 mm (0.004 ~ 0.060 in.)	– – –
Rear	0.1 ~ 1.5 mm (0.004 ~ 0.060 in.)	– – –

Special Tools

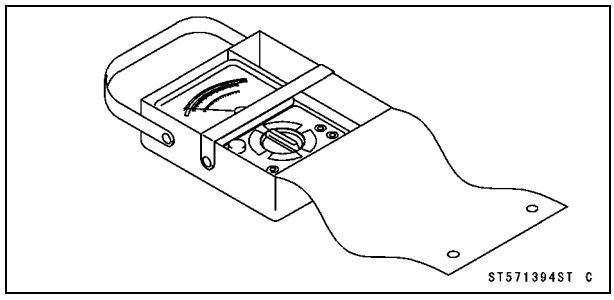
Jack:
57001-1238



Jack Attachment:
57001-1608

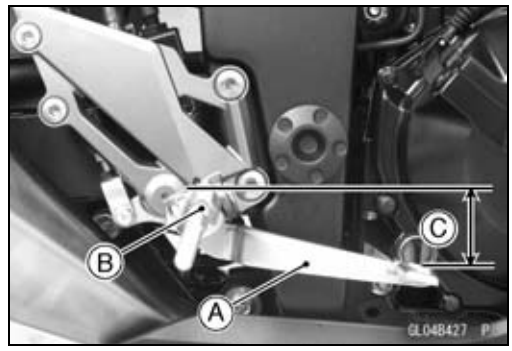


Hand Tester:
57001-1394



Brake Pedal

Brake Pedal Position Inspection

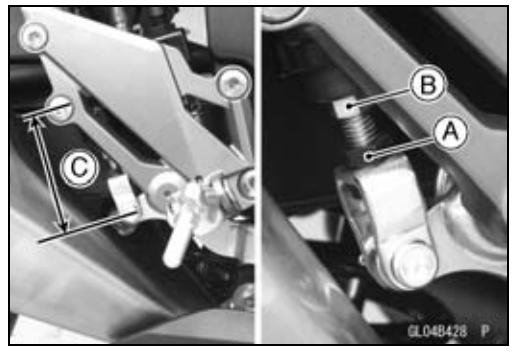


- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

Pedal Position
Standard: About 40 mm (1.57 in.) [C] below top of footpeg

★If it is incorrect, adjust the brake pedal position.

Brake Pedal Position Adjustment



NOTE

○*Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened.*

- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

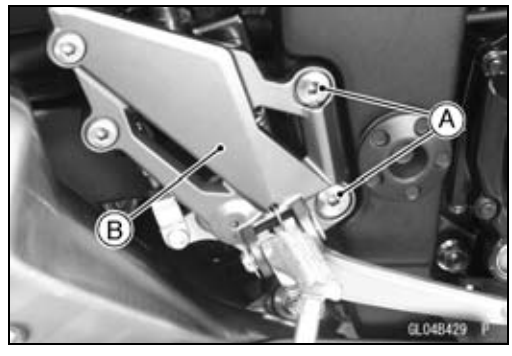
★If the length [C] shown is **78 ±1 mm (3.07 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

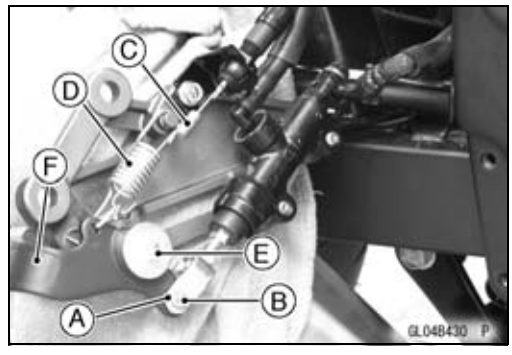
Torque - Rear Master Cylinder Push Rod Locknut: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).

Brake Pedal Removal



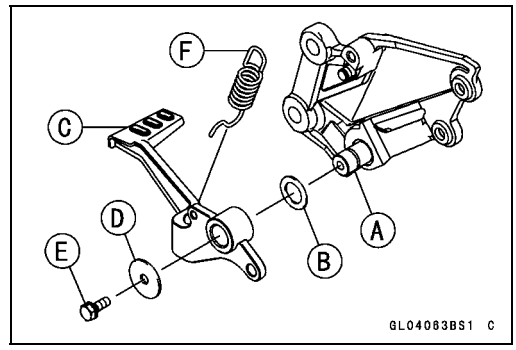
- Remove the right front footpeg bracket bolts [A].
- Turn the right front footpeg bracket [B] inside out.



- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Brake Light Switch Spring [C]
  Return Spring [D]
- Remove the brake pedal bolt [E] and brake pedal [F].

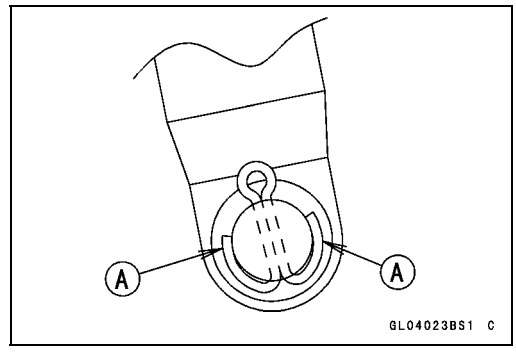
Brake Pedal

Brake Pedal Installation



- Apply grease to the pivot shaft [A] and install the washer [B].
- Install:
  Brake Pedal [C]
  Washer [D]
- Tighten:

  Torque - Brake Pedal Bolt [E]: 8.8 N·m (0.90 kgf·m, 78 in·lb)
- Hook:
  Rear Brake Light Switch Spring
  Return Spring [F]

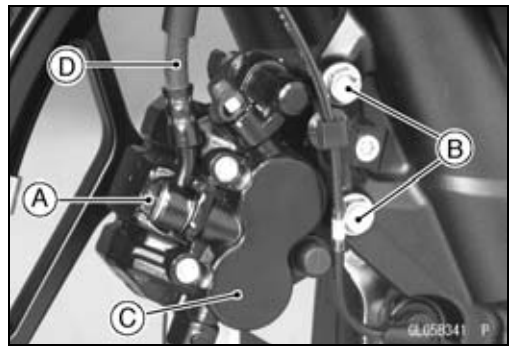


- Replace the cotter pin with a new one.
- Insert the joint pin from the outside.
- Insert the cotter pin and bend the pin ends [A].
- Install the right front footpeg bracket, and tighten the bolts.

  Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
- Check the brake pedal position (see Brake Pedal Position Inspection).

Calipers

Front Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B] and caliper [C].
- Remove the banjo bolt to disconnect the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

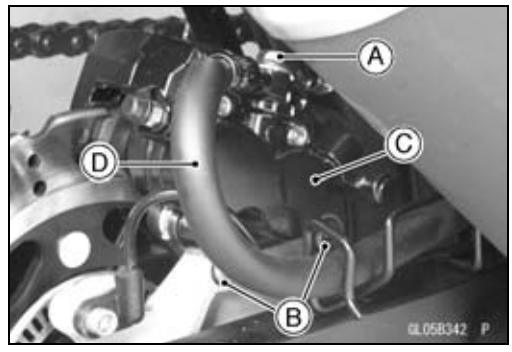
NOTICE

Immediately wash away any brake fluid that spills.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Front Caliper Disassembly).*

Rear Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B] and caliper [C].
- Remove the banjo bolt and disconnect the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

NOTICE

Immediately wash away any brake fluid that spills.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Rear Caliper Disassembly).*

Caliper Installation

- Install the caliper and brake hose lower end.

○Replace the washers on each side of hose fitting with new ones.

- Tighten:

Torque - Caliper Mounting Bolts:
Front: 25 N·m (2.5 kgf·m, 18 ft·lb)
Rear: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Calipers

Front Caliper Disassembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Disassembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Assembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Caliper Fluid Seal Damage Inspection

The fluid seals (piston seals) [A] are placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

● Replace the fluid seal if it exhibits any of the conditions listed below.

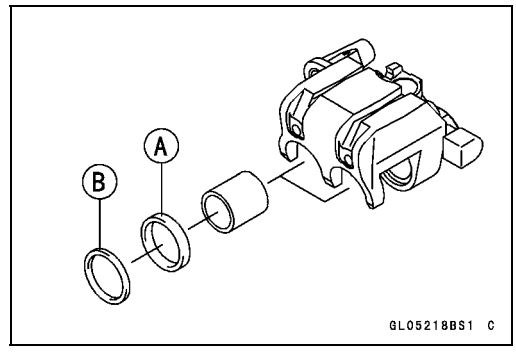
○Brake fluid leakage around the pad.

○Brakes overheat.

○Considerable difference in inner and outer pad wear.

○Seal and piston are stuck together.

★If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



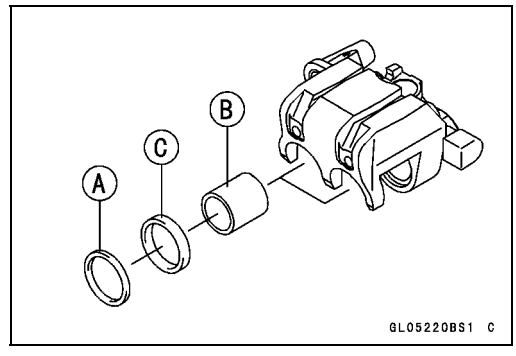
Caliper Dust Seal Damage Inspection

● Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace the dust seals with new ones.

Pistons [B]

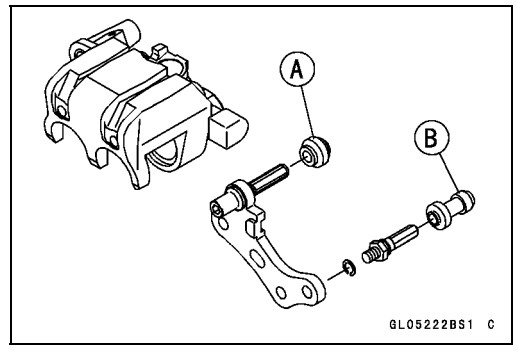
Fluid Seals [C]



Caliper Boots Inspection

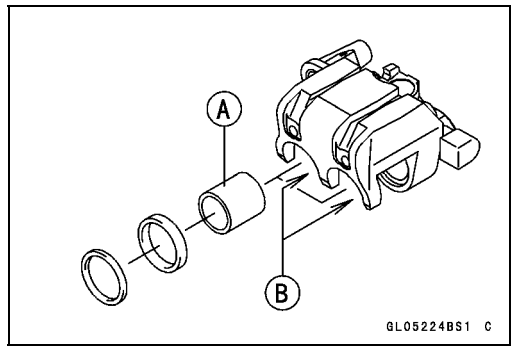
● Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace it.



Calipers

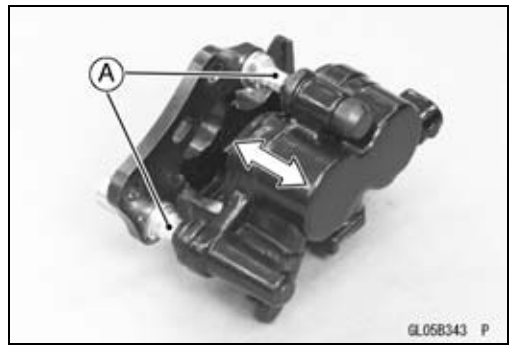
Caliper Piston and Cylinder Damage Inspection



- Visually inspect the pistons [A] and cylinder surfaces [B].

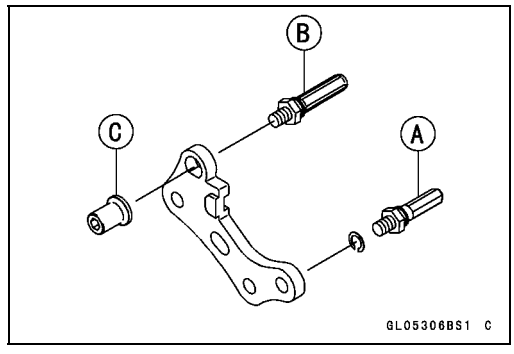
★Replace the caliper if the cylinder and piston are badly scores or rusty.

Caliper Holder Pin Inspection



The caliper body must slide smoothly on the caliper holder pins [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder pins are not badly worn or stepped, and that the rubber boots are not damaged.



★If the caliper holder pin is damage, inspect the caliper holder for warp or deformation. If the caliper holder is in good condition, replace the caliper holder pins [A] [B].

Torque - Caliper Holder Pin: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

○Apply a non-permanent locking agent to the threads of the caliper holder pin nut [C].

Torque - Caliper Holder Pin Nut: 22 N·m (2.2 kgf·m, 16 ft·lb)

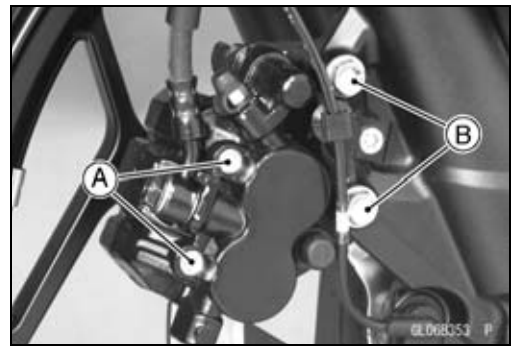
Brake Pads

Brake Pad Removal

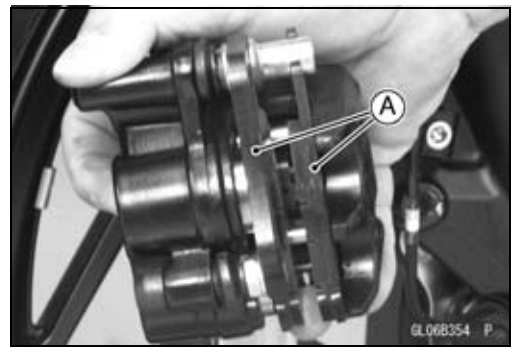
NOTE

○*The procedure to remove the front brake pad is as follows. Removing the rear brake pad is the same as for the front brake pad.*

- Loosen the pad pins [A].
- Remove the caliper mounting bolts [B].
- Remove the caliper with the hose installed.



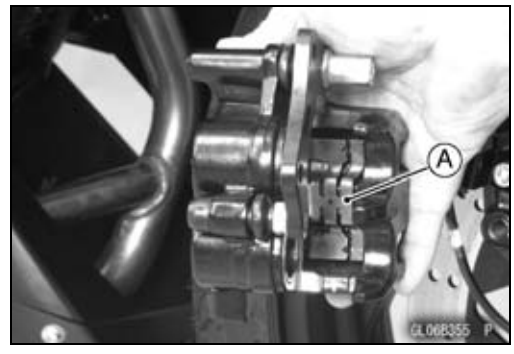
- Remove:
  Pad Pins
  Brake Pads [A]



Brake Pad Installation

NOTE

○*The procedure to install the front brake pad is as follows. Installing the rear brake pad is the same as for the front brake pad.*



- Push the caliper pistons in by hand as far as they will go.
- Install the pad spring [A] in its correct position.
- Install the pad on the piston side first, then install the other side pad on the holder.
- Insert the pad pins.

- Install the caliper (see Caliper Installation).
- Tighten:

Torque - Brake Pad Pins: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

⚠ WARNING

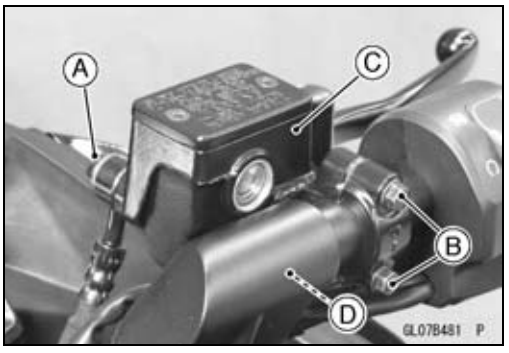
After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

Master Cylinder

Front Master Cylinder Removal

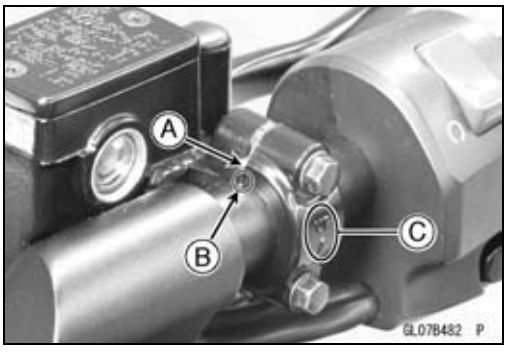


- Remove the banjo bolt [A] to disconnect the brake hose from the master cylinder (see Brake Hose Removal/Installation).
- Remove the clamp bolts [B] and remove the master cylinder [C] with the reservoir, brake lever, and brake switch as an assembly.
- Disconnect the front brake light switch connector [D].

NOTICE

Immediately wash away any brake fluid that spills.

Front Master Cylinder Installation



- Connect the front brake light switch connector.
- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebar.
- The master cylinder clamp must be installed with the arrow mark [C] upward.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

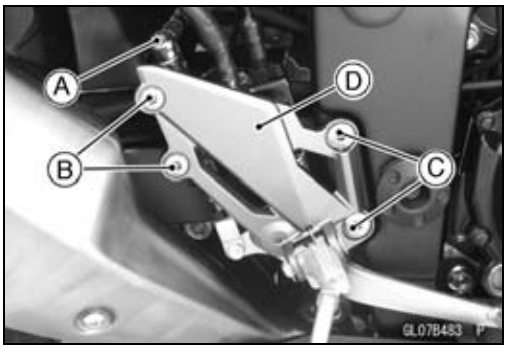
Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Replace the washers that are on each side of the hose fitting with new ones.
- Tighten:

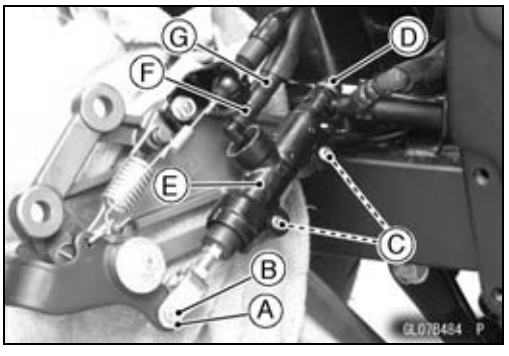
Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Rear Master Cylinder Removal



- Loosen the brake hose banjo bolt [A] and rear master cylinder mounting bolts [B].
- Remove the right front footpeg bracket bolts [C].
- Turn the right front footpeg bracket [D] inside out.



- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Master Cylinder Mounting Bolts [C]
  Brake Hose Banjo Bolt [D]
  Rear Master Cylinder [E]
- Slide the clamp [F] and disconnect the reservoir hose [G] from the rear master cylinder.
- Drain the brake fluid into a container.

Master Cylinder

Rear Master Cylinder Installation

- Connect the reservoir hose to the rear master cylinder and hold it with the clamp.
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:

Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Replace the cotter pin with a new one.
- Insert the joint pin from the outside.
- Insert the cotter pin and bend the pin ends.
- Install the right front footpeg bracket, and tighten the bolts.

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder

Master Cylinder Inspection

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

★If a master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].

★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

- Check the dust covers [E] for damage.

★If they are damaged, replace them.

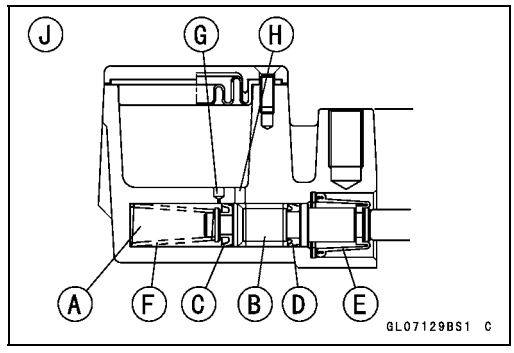
- Check the piston return springs [F] for any damage.

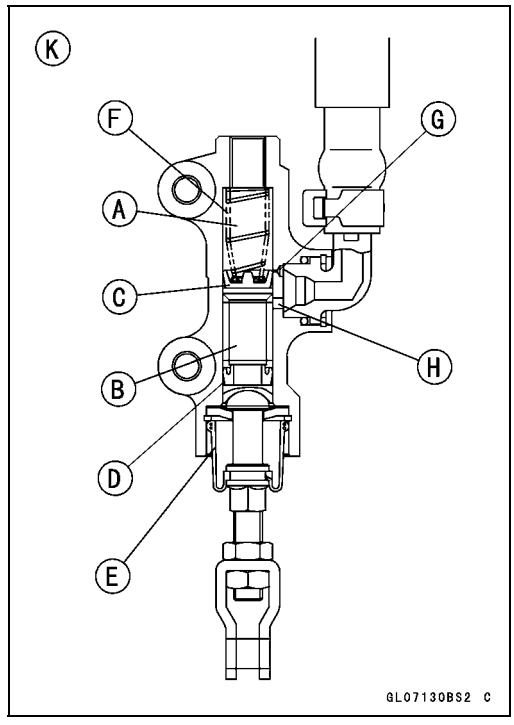
★If the springs are damaged, replace them.

- Check that relief port [G] and supply port [H] are not plugged.

★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [J]
Rear Master Cylinder [K]





Brake Disc

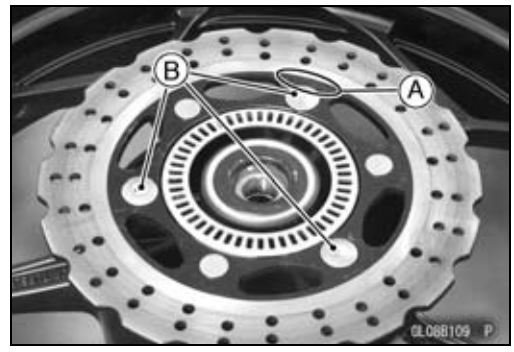
Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the mounting bolts and disc.

Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts [B], and tighten them.

Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)



Brake Disc Wear Inspection

- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.

Measuring Area [B]

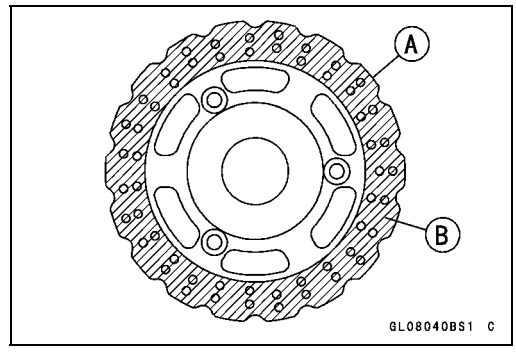
Brake Discs Thickness

Standard:

Front	**4.3 ~ 4.7 mm (0.17 ~ 0.19 in.)**
Rear	**4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)**

Service Limit:

Front	**4.0 mm (0.16 in.)**
Rear	**4.5 mm (0.18 in.)**



Brake Disc Warp Inspection

- Raise the front/rear wheel off the ground.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

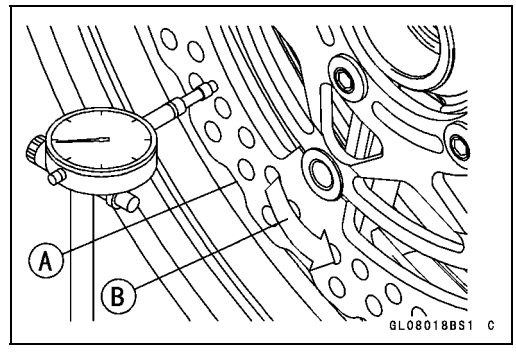
○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

★If runout exceeds the service limit, replace the disc.

Disc Runout

Standard:	**TIR 0.15 mm (0.006 in.) or less**
Service Limit:	**TIR 0.3 mm (0.01 in.)**



Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Brake Line Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

⚠ WARNING

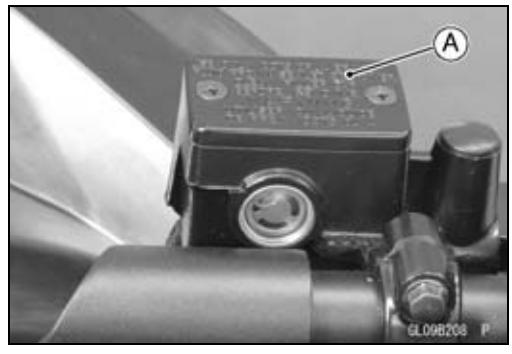
Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTE

○*The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

- Remove the reservoir cap [A] and diaphragm.
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.

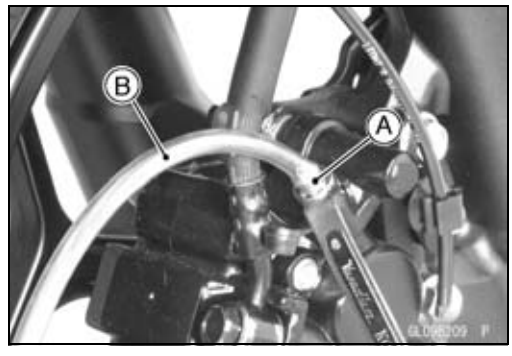
Brake Fluid Grade
Front: DOT3 or DOT4
Rear: DOT4



- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

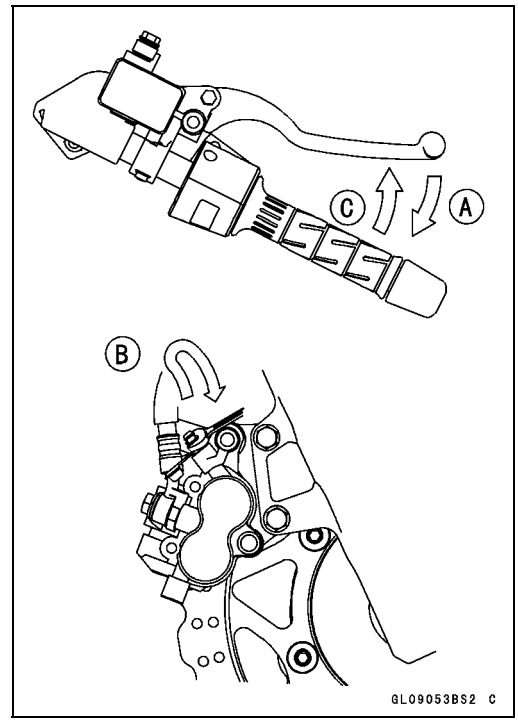
○Bleed the air completely from the master cylinder by this operation.

- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



Brake Fluid

● Bleed the brake line and the caliper.
○Repeat this operation until no more air can be seen coming out into the plastic hose.
1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].



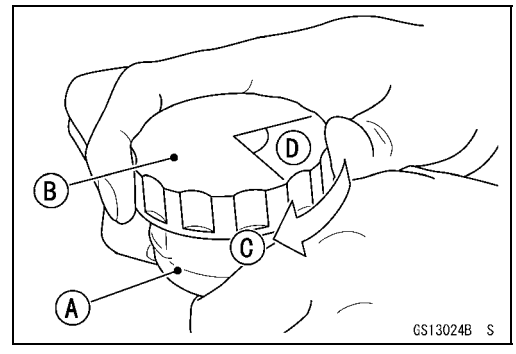
NOTE

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*
○*Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

● Remove the clear plastic hose.
● Install the diaphragm and reservoir cap.
● Tighten:

Torque - Front Brake Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

● Follow the procedure below to install the rear brake fluid reservoir cap correctly.
○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].



● Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

● Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
● After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake Fluid

⚠ WARNING

When working with the disc brake, observe the precautions listed below.

- **Never reuse old brake fluid.**
- **Do not use fluid from a container that has been left unsealed or that has been open for a long time.**
- **Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**
- **Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.**
- **Don't change the fluid in the rain or when a strong wind is blowing.**
- **Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.**
- **When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.**
- **Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.**
- **If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.**

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

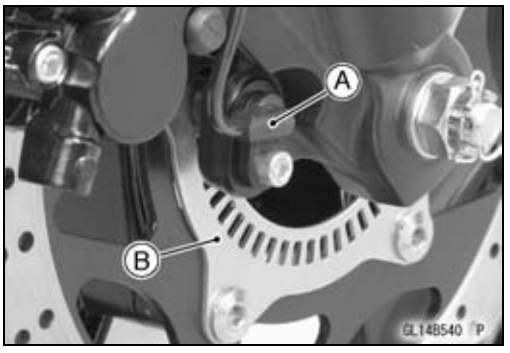
Brake Hose Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

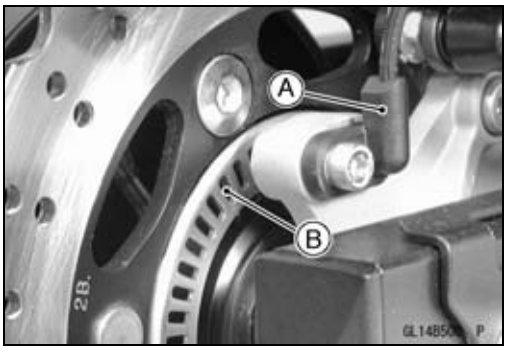
Anti-Lock Brake System (Equipped Models)

Parts Location

Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]

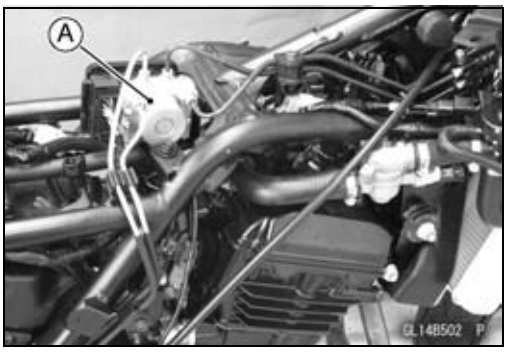


Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]

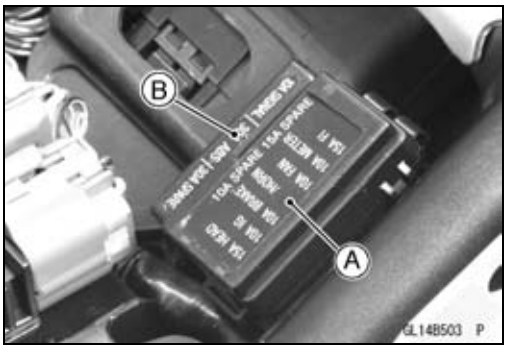


Yellow ABS Indicator Light (LED) [A]

ABS Hydraulic Unit [A]

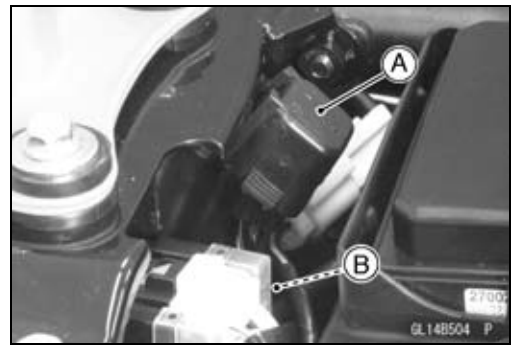


Fuse Box 1 [A]
Fuse Box 2 [B]

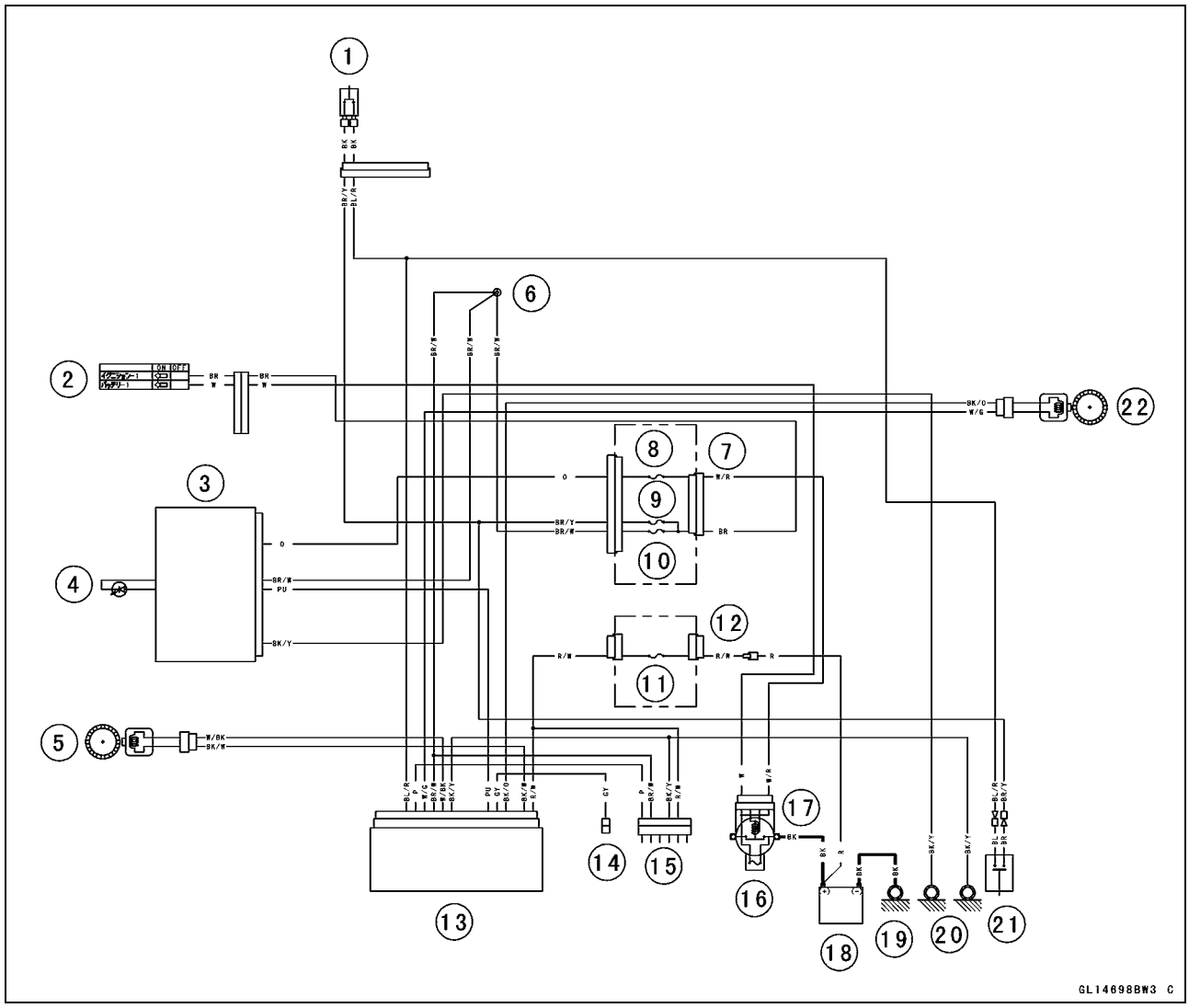


Anti-Lock Brake System (Equipped Models)

ABS Kawasaki Diagnostic System Connector [A]
ABS Self-diagnosis Terminal [B]



ABS System Wiring Diagram



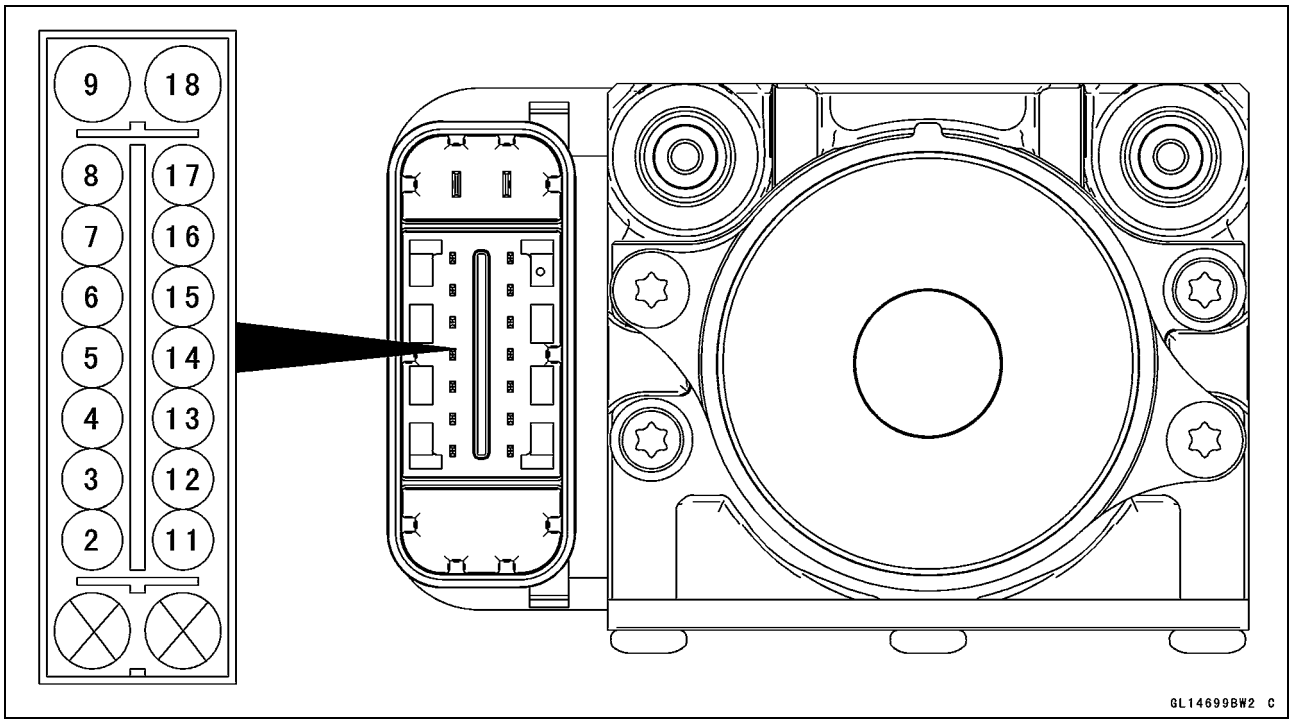
1. Front Brake Light Switch
2. Ignition Switch
3. Meter Unit
4. Yellow ABS Indicator Light (LED)
5. Front Wheel Rotation Sensor
6. Water-proof Joint 7
7. Fuse Box 1
8. Meter Fuse 10 A
9. Brake/Horn Fuse 10 A
10. Ignition Fuse 10 A
11. ABS Fuse 30 A
12. Fuse Box 2
13. ABS Hydraulic Unit
14. ABS Self-diagnosis Terminal
15. ABS Kawasaki Diagnostic System Connector
16. Main Fuse 30 A
17. Starter Relay
18. Battery 12 V 8 Ah
19. Engine Ground
20. Frame Ground 4
21. Rear Brake Light Switch
22. Rear Wheel Rotation Sensor

Anti-Lock Brake System (Equipped Models)

○Color Codes:

BK: Black	GY: Gray	PU: Purple
BL: Blue	LB: Light Blue	R: Red
BR: Brown	LG: Light Green	V: Violet
CH: Chocolate	O: Orange	W: White
DG: Dark Green	P: Pink	Y: Yellow
G: Green		

ABS Hydraulic Unit Terminal Names



2. Unused
3. Unused
4. Front and Rear Brake Light Switch Signal: BL/R
5. ABS Kawasaki Diagnostic System Terminal: P
6. Power Supply to Rear Wheel Rotation Sensor: W/G
7. Power Supply: BR/W
8. Power Supply to Front Wheel Rotation Sensor: W/BK
9. Ground: BK/Y
11. Unused
12. Unused
13. Yellow ABS Indicator Light (LED): V
14. ABS Self-Diagnosis Terminal: GY
15. Rear Wheel Rotation Sensor Signal Input: BK/O
16. Unused
17. Front Wheel Rotation Sensor Signal Input: BK/W
18. Power Supply to ABS Motor Relay: R/W

Anti-Lock Brake System (Equipped Models)

ABS Servicing Precautions

There are a number of important precautions that should be followed servicing the ABS system.

- This ABS system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ABS hydraulic unit.
- To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Do not turn the ignition switch on while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the ABS system is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the ABS hydraulic unit.
- Whenever the ABS electrical connections are to be disconnected, first turn the ignition switch off.
- The ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

Anti-Lock Brake System (Equipped Models)

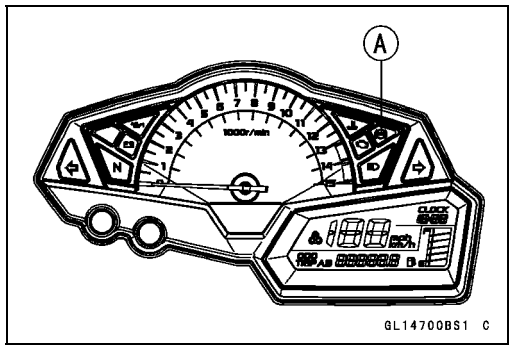
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

○The yellow ABS indicator light (LED) [A] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.



⚠ WARNING

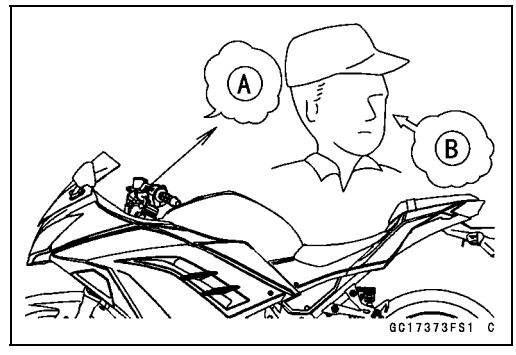
Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.

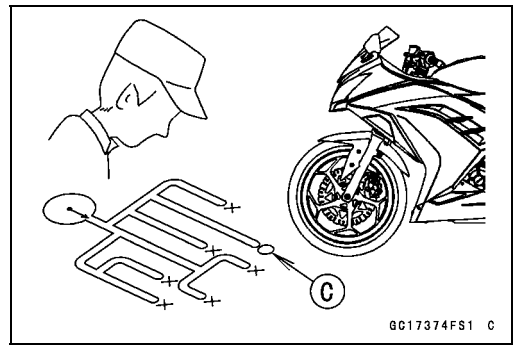
Anti-Lock Brake System (Equipped Models)

- ○The yellow ABS indicator light (LED) may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator light comes on, just turn the ignition switch off, then clear service code 42, which indicates a “Faulty front wheel rotation sensor”.
- ○When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.
- ○Service codes detected once by the ABS hydraulic unit will be memorized in the ABS hydraulic unit. Therefore, after maintenance work is finished, be sure to erase the service codes. Do not erase the service codes during troubleshooting. Wait until all the checks and repair work are finished to prevent duplication of previous service codes and unnecessary maintenance work.
- ○Before delivering the motorcycle to the customer, be sure to erase any service codes which might be stored in the ABS hydraulic unit. Using the self-diagnosis feature, make sure that the yellow ABS indicator light (LED) lights. A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 30 km/h (19 mph) to see that the yellow ABS indicator light (LED) does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (19 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (the reaction force generated is felt in the brake lever and pedal). This completes the final inspection.

ABS Troubleshooting Outline

When an abnormality in the system occurs, the yellow ABS indicator light (LED) lights up to alert the rider. In addition, the nature of the fault is stored in the memory of the ABS hydraulic unit and when in the self-diagnosis mode, the service code [A] is indicated by the number of times the yellow ABS indicator light (LED) blinks. The service codes stored in memory are not erased until the mode has been changed to the fault erase mode after the fault has been corrected. Therefore, after correcting the problem, always erase the service codes and then run the self-diagnosis program to confirm normal signal output. When, due to a malfunction, the yellow ABS indicator light (LED) remains lit, get a thorough understanding of the background before starting the repair work. Ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C]. Do not rely solely on the ABS self-diagnosis function, use common sense; check the brakes for proper braking power, and brake fluid level, search for leaks, etc.





Anti-Lock Brake System (Equipped Models)

Even when the ABS is operating normally, the yellow ABS indicator light (LED) may light up under the conditions listed below. Turn the ignition switch off to stop the indicator light. If the motorcycle runs without erasing the service code, the light may light up again.

○After continuous riding on a rough road.
○When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
○When accelerating so abruptly that the front wheel leaves the ground.
○When the ABS has been subjected to strong electrical interference.
○When tire pressure is abnormal. Adjust tire pressure.
○When a tire different in size from the standard size is being used. Replace with standard size.
○When the wheel is deformed. Replace the wheel.

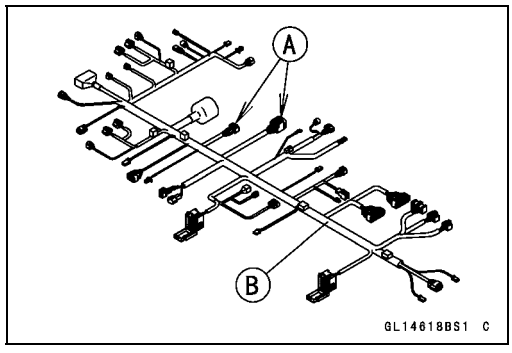
Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

● Carry out pre-diagnosis inspections as a preliminary inspection.
● Determine the fault using the self-diagnosis function.
● Check wiring and connections from the ABS hydraulic unit connector to the suspected faulty ABS part, using the hand tester.

Special Tool - Hand Tester: 57001-1394

● Visually inspect the wiring for signs of burning or fraying.
★If any wiring is poor, replace the damaged wiring.
● Pull each connector [A] apart and inspect it for corrosion, dirt and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
● Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○Connect the hand tester between the ends of the leads.



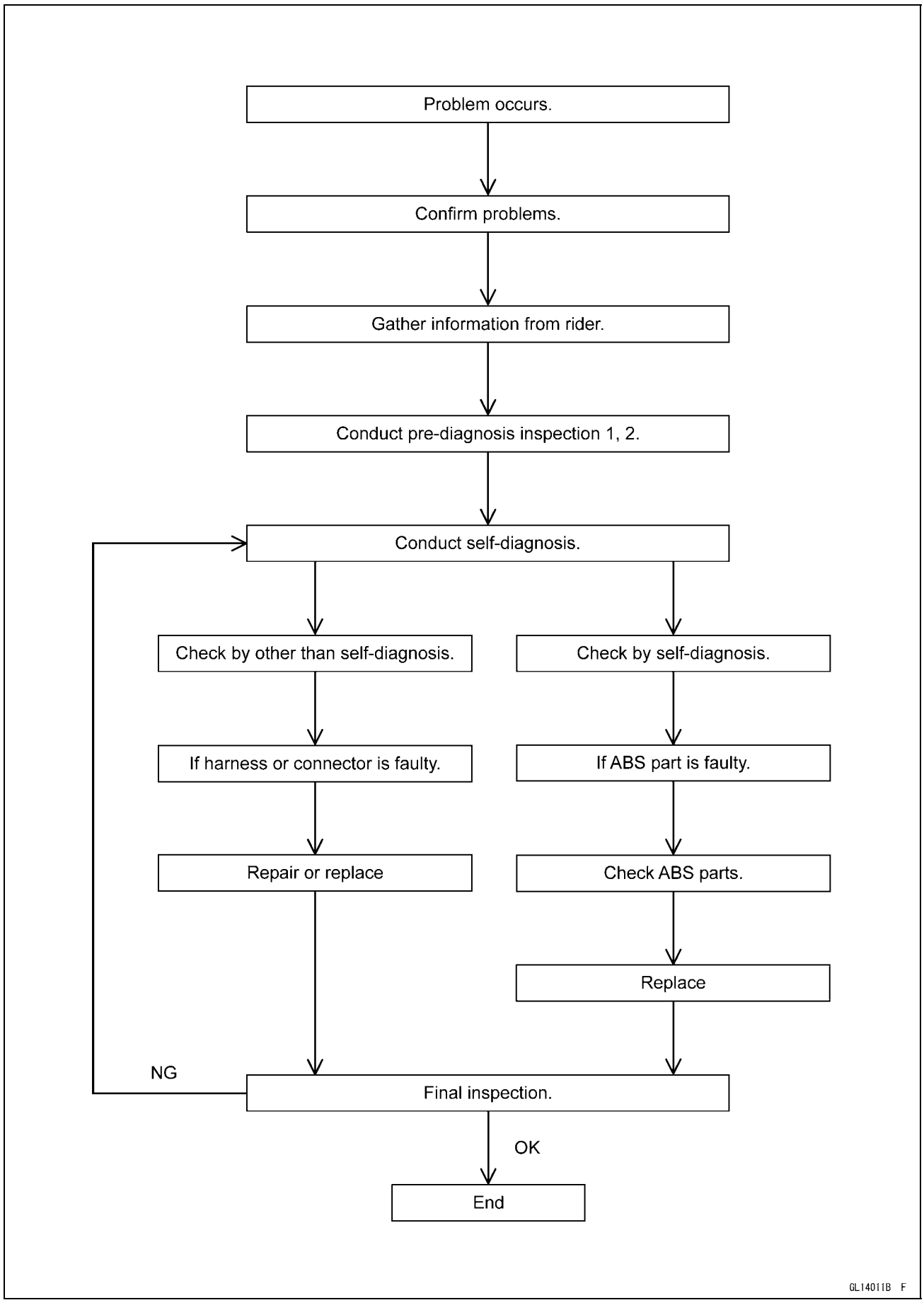
Special Tool - Hand Tester: 57001-1394

○Set the tester to the × 1 Ω range, and read the tester.
★If the tester does not read 0 Ω, the lead is defective. Replace the main harness [B] if necessary.

● Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.
★If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.
★If an abnormality is found, replace the affected ABS part.

Anti-Lock Brake System (Equipped Models)

ABS Diagnosis Flow Chart



Anti-Lock Brake System (Equipped Models)

Inquiries to Rider

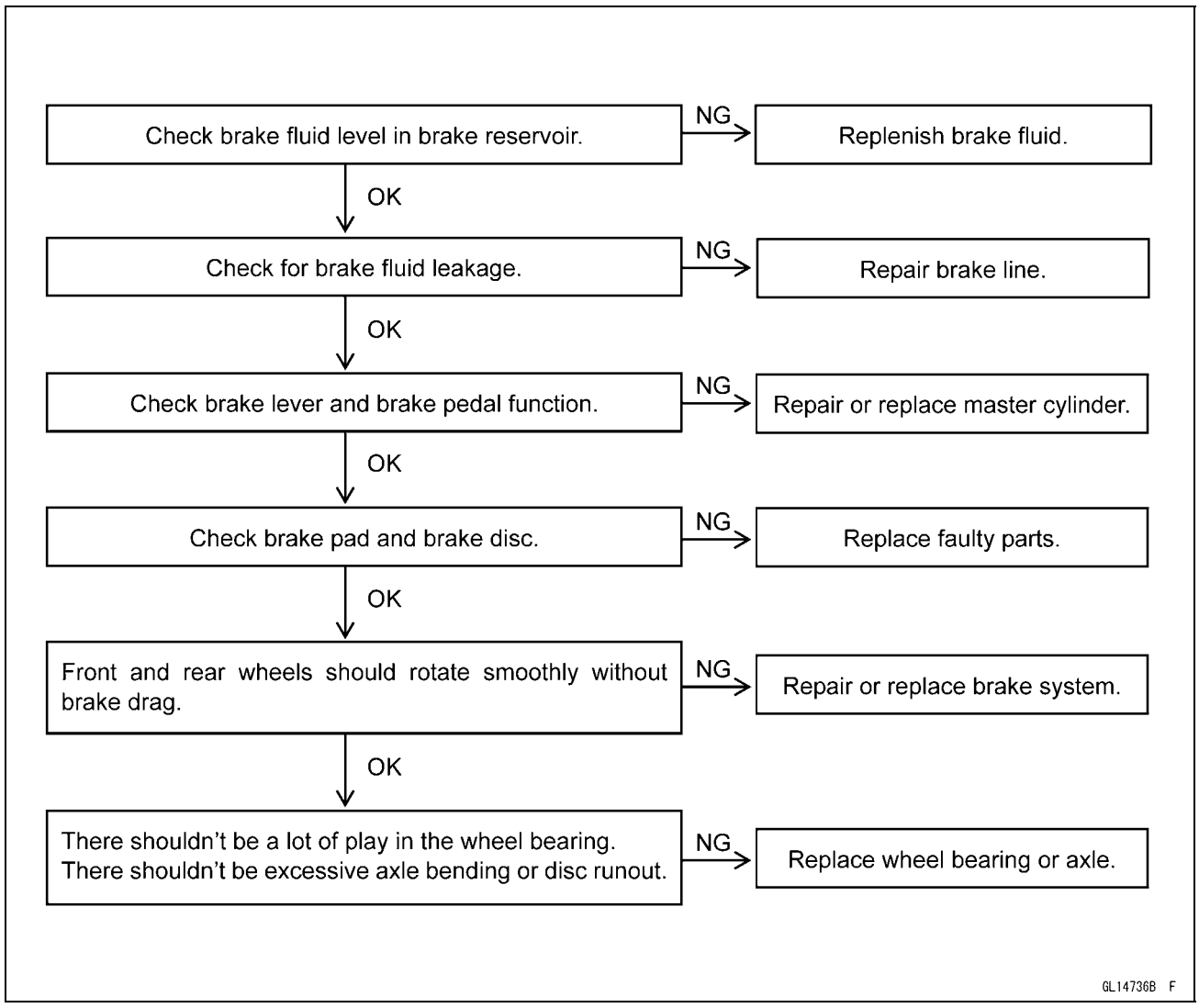
- ○Each rider reacts to problems in different ways, so it is important to confirm what kind of condition the rider is dissatisfied with.
- ○Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the shop.
- ○The diagnosis sheet will help prevent you from overlooking any keys, so always use it.

Sample Diagnosis Sheet

Rider name:		Registration No. (license plate No.):
Year of initial registration:		Model:
Engine No.:		Frame No.:
Date problem occurred:		Frequency:
Weather:		Mileage:
Phenomenon	☐ Brake lever vibration or noise ☐ Pedal vibration or noise	
	☐ Yellow ABS indicator light (LED) blinks ☐ Yellow ABS indicator light (LED) remains lit up	
	☐ Braking distance too long	
	☐ Abnormal brake lever movement ☐ Abnormal pedal movement	
	☐ ABS not working	
	☐ ABS works but yellow ABS indicator light (LED) doesn't light up	
	☐ ABS operating too frequently	
Engine conditions at problem	☐ At start-up ☐ After starting ☐ At 5 000 r/min (rpm) or more	
Road conditions	☐ Slippery road (☐ snow, ☐ gravel, ☐ other) ☐ Rough surface ☐ Other	
Driving conditions	☐ High-speed cornering ☐ Driving 30 km/h (19 mph) or above ☐ Driving below 30 km/h (19 mph) ☐ When stopping ☐ When turning	
Brake application	☐ Gradual ☐ Abrupt	
Other conditions	☐ Large brake lever stroke ☐ Large pedal stroke	

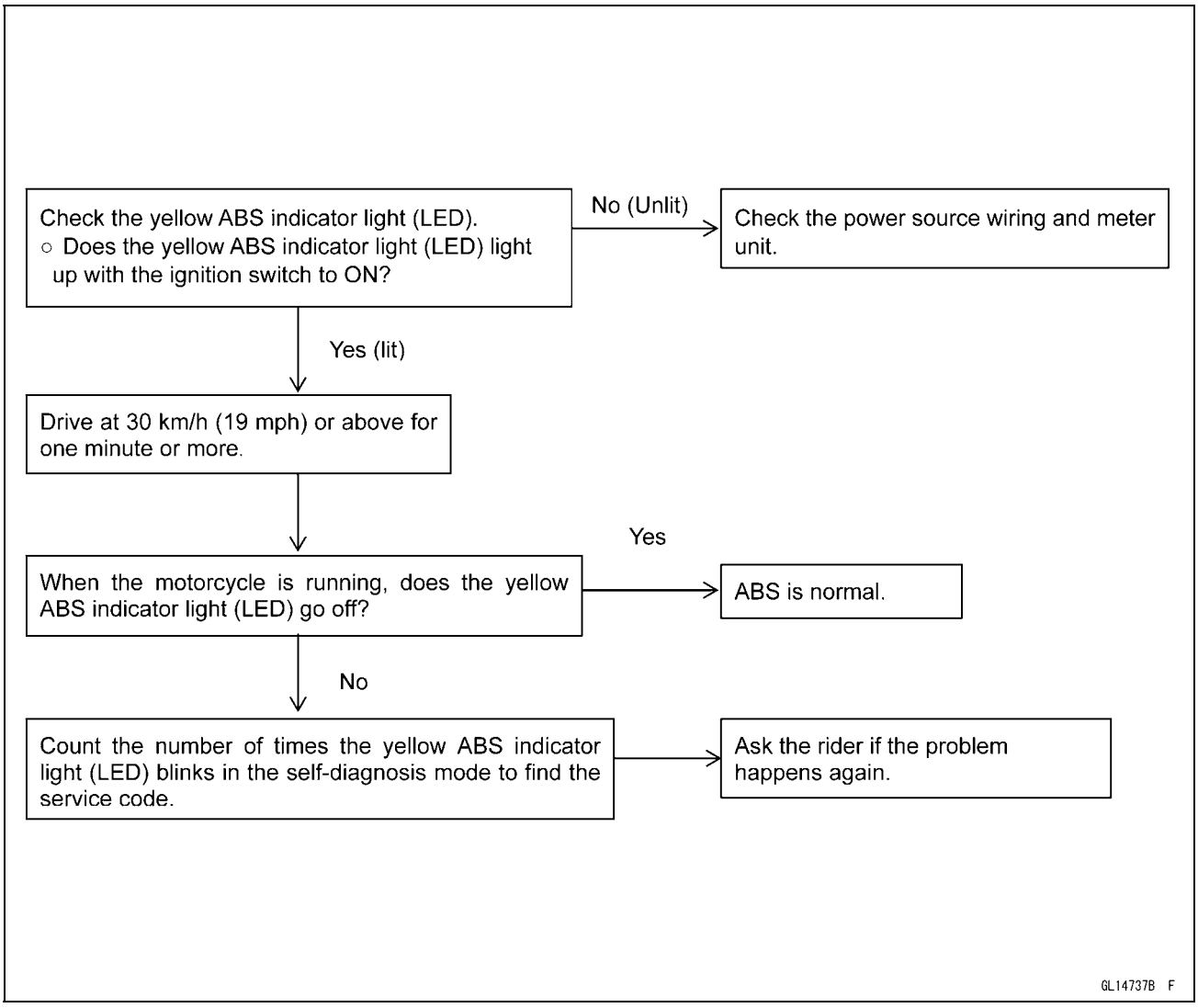
Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 1



Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 2


Check the yellow ABS indicator light (LED).
○ Does the yellow ABS indicator light (LED) light up with the ignition switch to ON?
No (Unlit)
Check the power source wiring and meter unit.
Yes (lit)
Drive at 30 km/h (19 mph) or above for one minute or more.
When the motorcycle is running, does the yellow ABS indicator light (LED) go off?
Yes
ABS is normal.
No
Count the number of times the yellow ABS indicator light (LED) blinks in the self-diagnosis mode to find the service code.
Ask the rider if the problem happens again.
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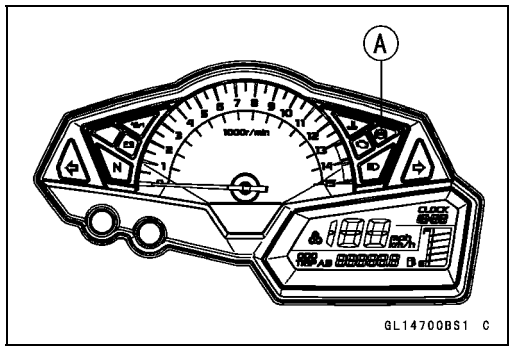
Self-diagnosis Outline

When the yellow ABS indicator light (LED) has blinked or come on, the ABS hydraulic unit memorizes and stores the service code for the service person to troubleshoot easily. The service code memory is powered directly by the battery and cannot be canceled by the ignition switch.

The ABS hydraulic unit can memorize up to all service codes. Further service codes are memorized after erasing the preceding all service codes. If there is no fault, the yellow ABS indicator light (LED) lights, indicating that “The ABS is normal”.

Self-diagnosis Procedures

○Before performing the self-diagnosis procedures, make sure that the yellow ABS indicator light (LED) [A] stays on to indicate any electrical problem occurring in the ABS system.



NOTE

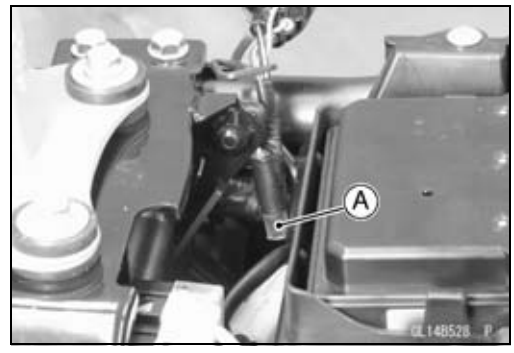
○*Use a fully charged battery for performing self-diagnosis procedure properly. A insufficient battery may cause improperly result.*

○*The self-diagnosis procedures should be done with the motorcycle is stopped.*

Anti-Lock Brake System (Equipped Models)

- The ABS hydraulic unit can be store the service codes including previous ones.
- To read out the current service code, erase the stored service codes once prior reading the service code (see Service Code Clearing Procedures).
- Test ride the motorcycle with 30 km/h (19 mph) or more in a safety area to store the service code, which correspond to the current problems.

- Remove the seat (see Seat Removal in the Frame chapter).
- Ground the self-diagnosis terminal [A] (Gray) to a frame ground, using a suitable auxiliary lead. Keep the auxiliary lead ground during self-diagnosis procedure.
- Turn the ignition switch to on and read the service code (see How to Read Service Code).
- To exit the self-diagnosis mode, remove the auxiliary lead from the self-diagnosis terminal.



NOTE

○*The grounding auxiliary lead must be removed after the self-diagnosis procedure.*

Service Code Clearing Procedures

- Start the service code erase mode with the following procedure.

○The erase mode starts when the ABS self-diagnosis terminal is disconnected from the frame ground after starting the self-diagnosis mode.

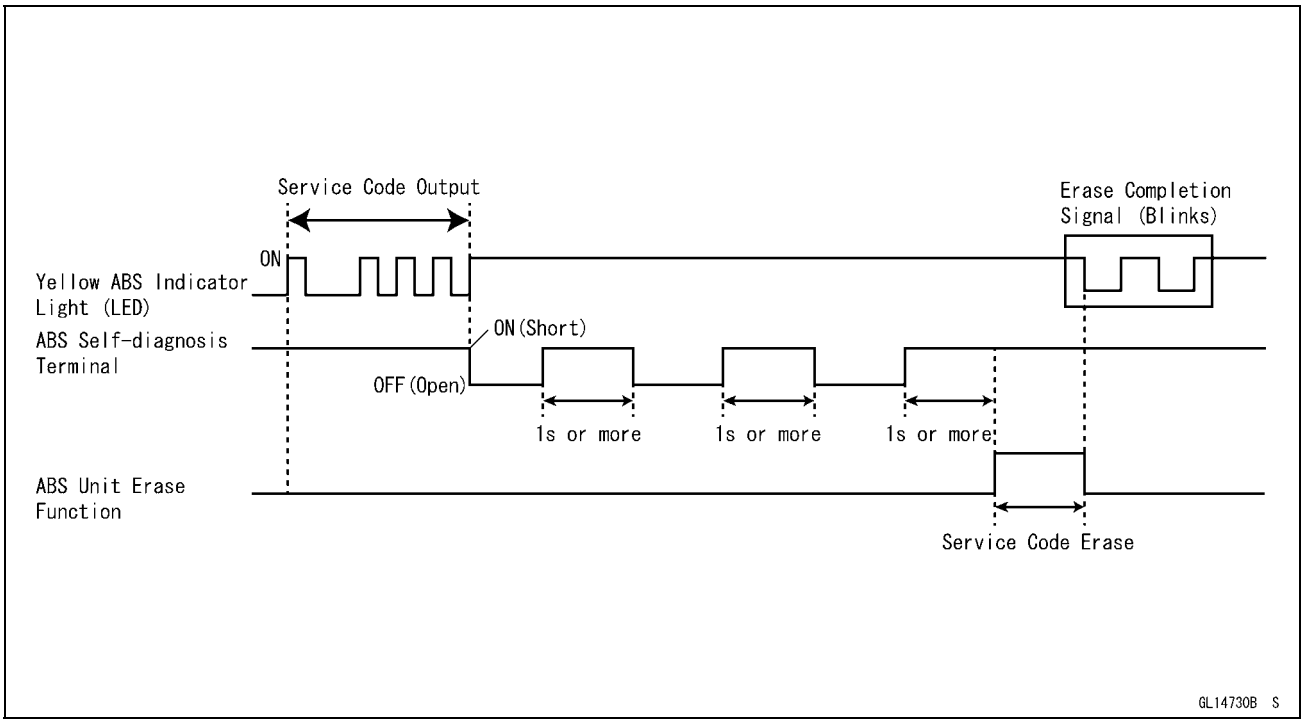
○The service code can be erased by grounding (time for at least one second) and ungrounding the ABS self-diagnosis terminal three times or more within about 12.5 seconds after starting the erase mode and grounding it.

○The yellow ABS indicator light (LED) remains lit during the erase mode.

○After erasing, the yellow ABS indicator light (LED) blinks two times and lights.

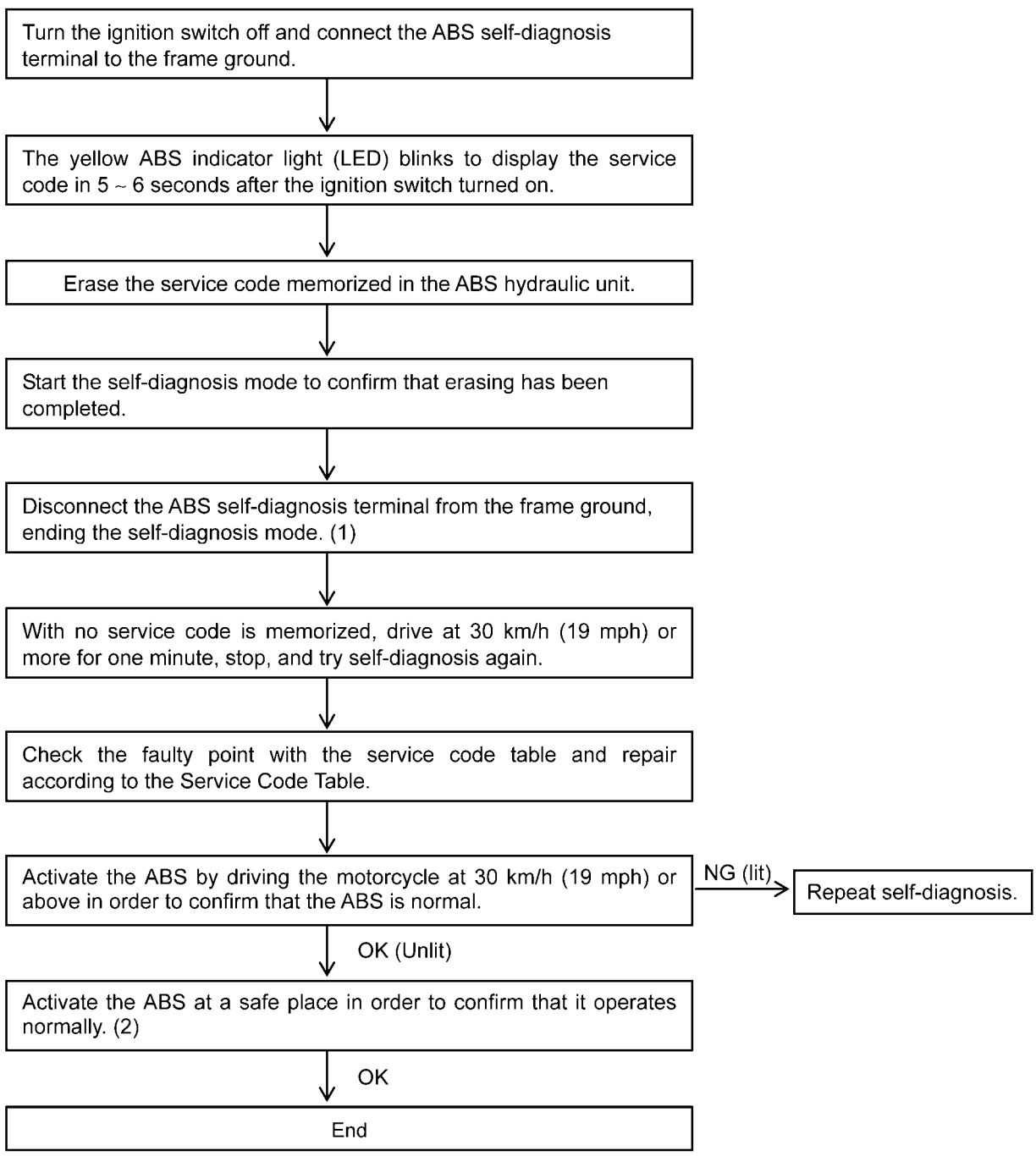
○Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, the yellow ABS indicator light (LED) lights.

Anti-Lock Brake System (Equipped Models)



Anti-Lock Brake System (Equipped Models)

Self-diagnosis Flow Chart


Turn the ignition switch off and connect the ABS self-diagnosis terminal to the frame ground.
The yellow ABS indicator light (LED) blinks to display the service code in 5 ~ 6 seconds after the ignition switch turned on.
Erase the service code memorized in the ABS hydraulic unit.
Start the self-diagnosis mode to confirm that erasing has been completed.
Disconnect the ABS self-diagnosis terminal from the frame ground, ending the self-diagnosis mode. (1)
With no service code is memorized, drive at 30 km/h (19 mph) or more for one minute, stop, and try self-diagnosis again.
Check the faulty point with the service code table and repair according to the Service Code Table.
Activate the ABS by driving the motorcycle at 30 km/h (19 mph) or above in order to confirm that the ABS is normal.
NG (lit)
Repeat self-diagnosis.
OK (Unlit)
Activate the ABS at a safe place in order to confirm that it operates normally. (2)
OK
End

(1): The self-diagnosis mode ends following.
When the ignition switch is OFF.
When the motorcycle is driven while in the self-diagnosis mode.
When the self-diagnosis terminal disconnects.
(2): Apply brake suddenly at 30 km/h (19 mph) or more to confirm that the motorcycle stops smoothly and steady with pulsation on the brake lever and pedal.

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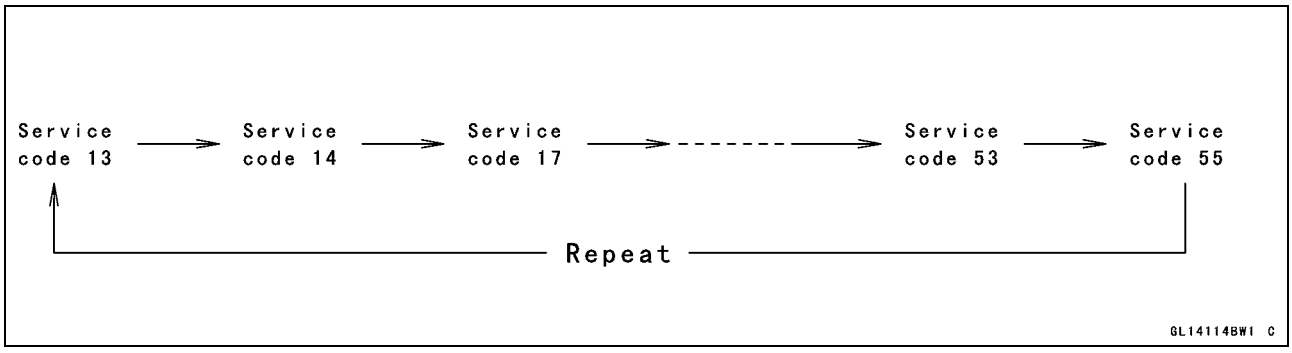
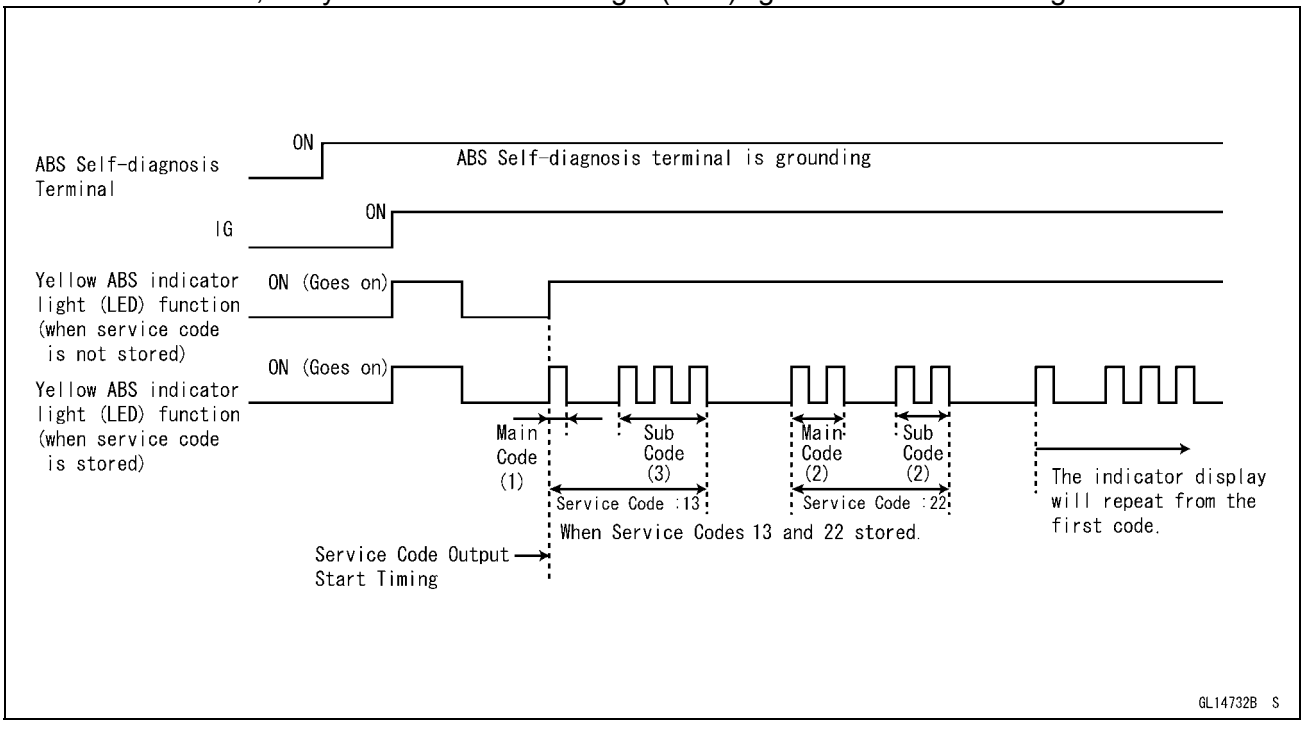
Anti-Lock Brake System (Equipped Models)

How to Read Service Codes

○Service codes are shown by a series of long and short blinks of the yellow ABS indicator light (LED) as shown below.
○Read 10th digit and unit digit as the yellow ABS indicator light (LED) blinks.
○When there are a number of faults, a maximum of all service codes can be stored.
○For the display pattern, the display will begin starting from the small number code entered, then the display is repeated from the smallest number code once again.



○If there is no fault, the yellow ABS indicator light (LED) lights as shown in the figure.

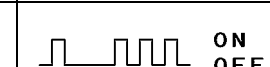
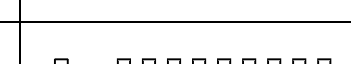
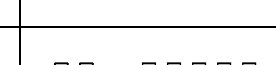
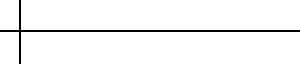
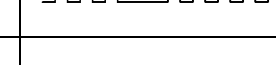
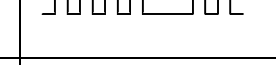
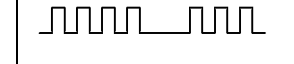
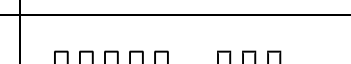

ABS Self-diagnosis Terminal
ON
ABS Self-diagnosis terminal is grounding
IG
ON
Yellow ABS indicator light (LED) function (when service code is not stored)
ON (Goes on)
Yellow ABS indicator light (LED) function (when service code is stored)
ON (Goes on)
Main Code (1)
Sub Code (3)
Main Code (2)
Sub Code (2)
Service Code :13
Service Code :22
When Service Codes 13 and 22 stored.
Service Code Output Start Timing
The indicator display will repeat from the first code.
GL14732B S

How to Erase Service Codes

○Even if the ignition switch is turned off, the battery or the ABS hydraulic unit are disconnected, all service codes remain in the ABS hydraulic unit.
○Refer to the Service Code Clearing Procedure for the service code erasure.

Anti-Lock Brake System (Equipped Models)

Service Code Table

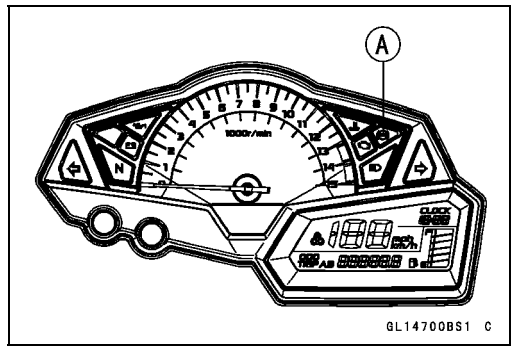
Service Code	Yellow ABS Indicator Light (LED)	Problems	Light State
–	Stays on* (Error function after the ignition switch turned on)	Main harness, meter unit, wheel rotation sensor(s) or ABS unit abnormal	ON
–	Does not go on (When the ignition switch turned on)	Main harness, meter unit or ABS unit abnormal	OFF
13		Rear intake solenoid valve trouble (wiring shorted or open)	ON
14		Rear outlet solenoid valve trouble (wiring shorted or open)	ON
17		Front intake solenoid valve trouble (wiring shorted or open)	ON
18		Front outlet solenoid valve trouble (wiring shorted or open)	ON
19		ABS solenoid valve relay trouble [stuck relay (ON or OFF)]	ON
25		Front, rear wheel rotation difference abnormal (substandard tire)	ON
35		ABS motor trouble (mechanical stuck)	ON
42		Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
43		Front or rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
44		Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
45		Rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
52		Power supply voltage abnormal (low-voltage)	ON
53		Power supply voltage abnormal (high-voltage)	ON
55		ABS Hydraulic Unit Internal Error (ECU operation abnormal)	ON

*: In spite of the service code is not stored, the yellow ABS Indicator Light (LED) does not go off when the 2 seconds later from the ignition switch turned on.

Anti-Lock Brake System (Equipped Models)

Yellow ABS Indicator Light (LED) Inspection

○In this model, the yellow ABS indicator light (LED) [A] goes on or blinks by the control of the ABS hydraulic unit.



Yellow ABS Indicator Light (LED) Stays ON (Error function after the ignition switch turned on - No Service Code)

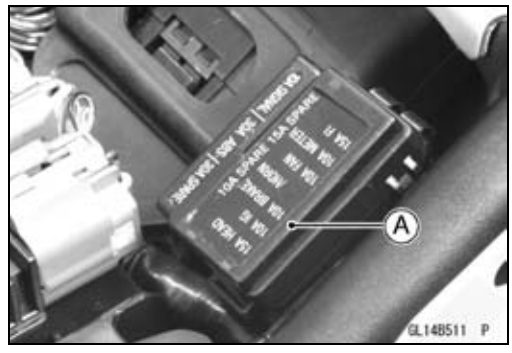
- Perform the Pre-Diagnosis Inspection 1.
- Check the system connectors for loose or poorly contact.

Step 1

- Check the ignition fuse 10 A in the fuse box 1 [A] for blown.

★If the fuse is blown, replace the fuse.

★If the fuse is not blown, go to next step.



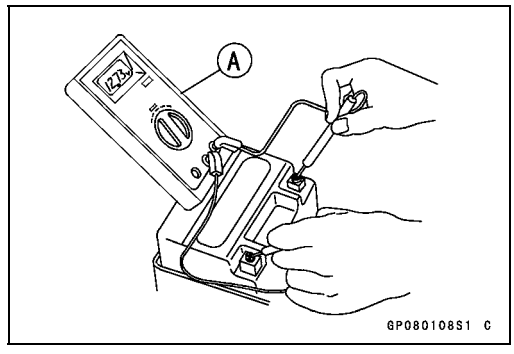
Step 2

- Measure the battery terminal voltage using a voltmeter [A].

○The battery voltage should be within 10 ~ 16 V.

★If the voltage without specifications, recharge or replace the battery.

★If the voltage within specifications, go to next step.



Step 3

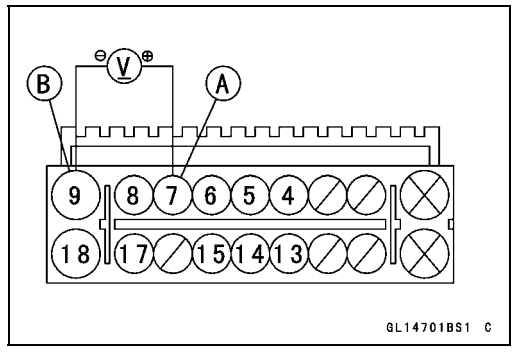
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 7 (BR/W) (+) [A] and terminal 9 (BK/Y) (–) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should be appeared while the ignition switch turned on.

★If the battery voltage appeared, go to step 4.

★If the battery voltage does not appear, go to next step.



Step 3-1

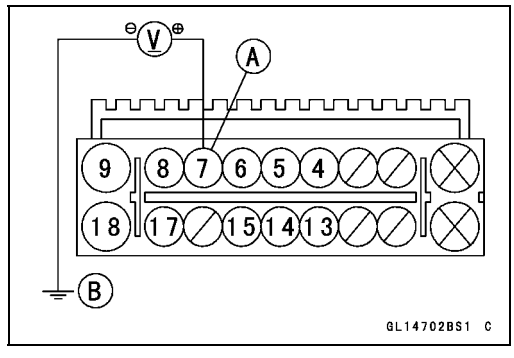
- Check the voltage between the terminal 7 (BR/W) (+) [A] of the ABS hydraulic unit connector and a frame ground (–) [B].

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should be appeared while the ignition switch turned on.

★If the battery voltage does not appear, repair or replace the main harness.

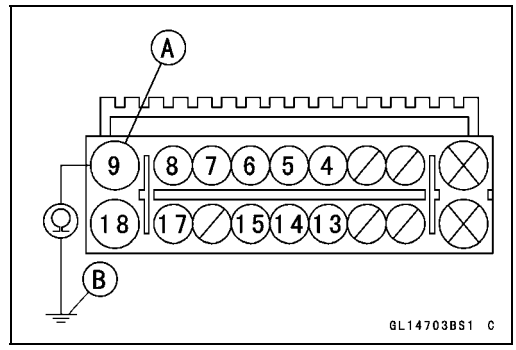
★If the battery voltage appeared, go to next step.



Anti-Lock Brake System (Equipped Models)

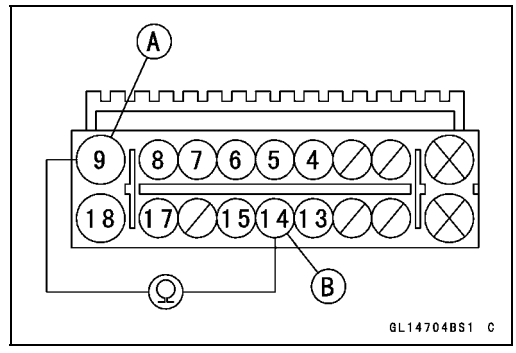
Step 3-2
- Check for continuity between the terminal 9 (BK/Y) [A] of the ABS hydraulic unit connector and a frame ground [B].

★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the ABS hydraulic unit.



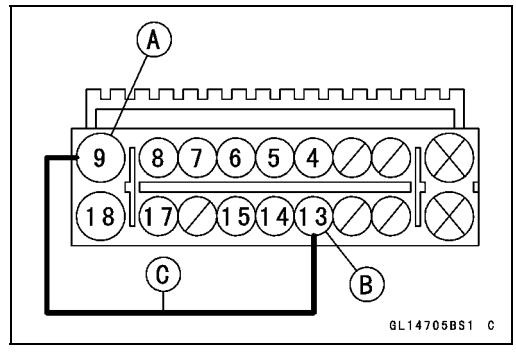
Step 4
- With the self-diagnosis terminal connected to the ground, check for continuity between the terminal 9 (BK/Y) [A] and terminal 14 (GY) [B] of the ABS hydraulic unit connector.

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



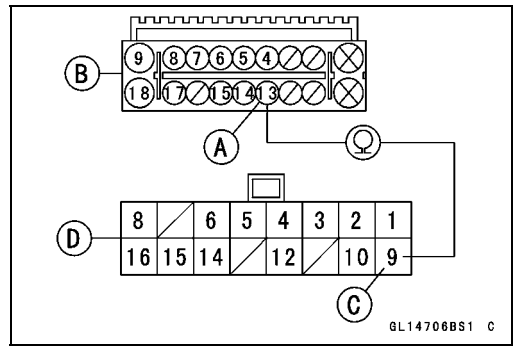
Step 5
- Jump the terminal 9 (BK/Y) [A] and terminal 13 (V) [B] at the ABS hydraulic unit connector using a jumper read [C].
- Check the yellow ABS indicator light (LED) with the ignition switch turned on.

★If the indicator goes off, replace the ABS hydraulic unit.
★If the indicator goes on, go to next step.



Step 6
- Disconnect the connector from the meter unit (see Meter Unit Removal in the Electrical System chapter).
- Check for continuity between the terminal 13 (V) [A] of the ABS hydraulic unit connector [B] and terminal 9 (V) [C] of the meter connector [D].

★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the meter unit with a new one.



Yellow ABS Indicator Light (LED) does not go on (When the Ignition Switch turned on)
- Perform the Pre-Diagnosis Inspection 1.
- Check the system connectors for loose or poorly contact.

Step 1
- Check the meter fuse 10 A in the fuse box 1 for blown.

★If the fuse is blown, replace the fuse.
★If the fuse is not blown, go to next step.

Anti-Lock Brake System (Equipped Models)

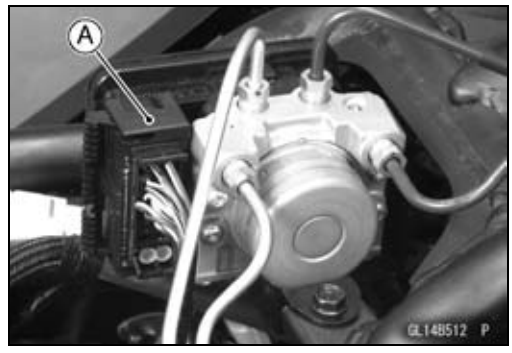
Step 2

- Disconnect the ABS hydraulic unit connector [A] and check the yellow ABS indicator light (LED) for function.

○The yellow ABS indicator light (LED) should goes on when the ignition switch turned on.

★If the indicator does not goes on, go to next step.

★If the indicator goes on, go to step 3.

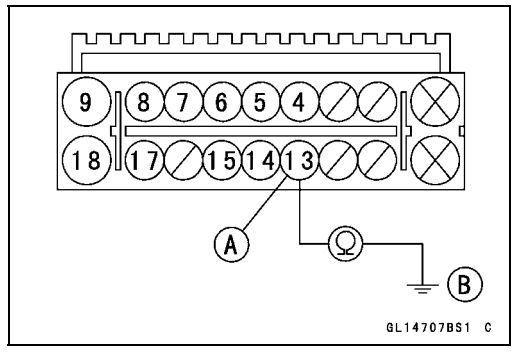


Step 2-1

- Disconnect the connector from the meter unit (see Meter Unit Removal in the Electrical System chapter).
- Check for continuity between the terminal 13 (V) [A] of the ABS hydraulic unit connector and a frame ground [B].

★If there is continuity, repair or replace the main harness.

★If there is no continuity, replace the meter unit with a new one.



Step 3

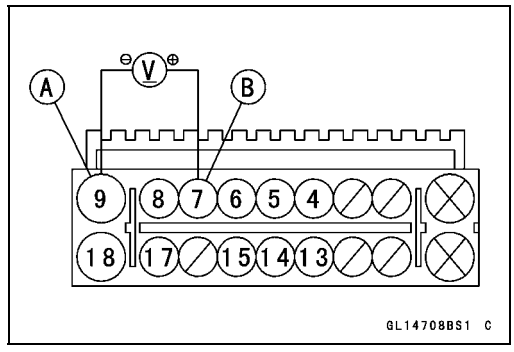
- Check the voltage between the terminal 9 (BK/Y) (–) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, go to next step.



Step 4

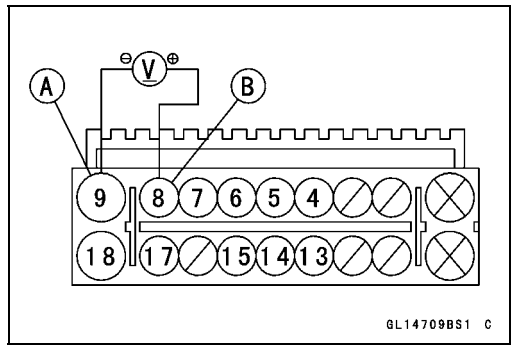
- Check the voltage between the terminal 9 (BK/Y) (–) [A] and terminal 8 (W/BK) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, go to next step.



Step 5

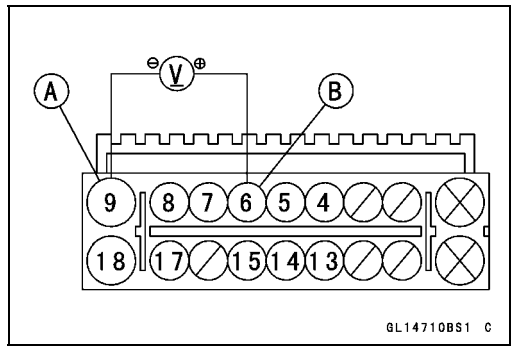
- Check the voltage between the terminal 9 (BK/Y) (–) [A] and terminal 6 (W/G) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, replace the ABS hydraulic unit.



Anti-Lock Brake System (Equipped Models)

ABS Unit Solenoid Valve Inspection (Service Code 13, 14, 17, 18)

○These codes indicate there is a problem in the solenoid valves, which integrated into the ABS Hydraulic Unit. Therefore the solenoid valves cannot be checked directly.

- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code and then perform the pre-diagnosis inspection 1 and 2.

★If same service code is indicated again, faulty solenoid valve in the ABS hydraulic unit. Replace the ABS hydraulic unit.

★If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

ABS Solenoid Valve Relay Inspection (Service Code 19)

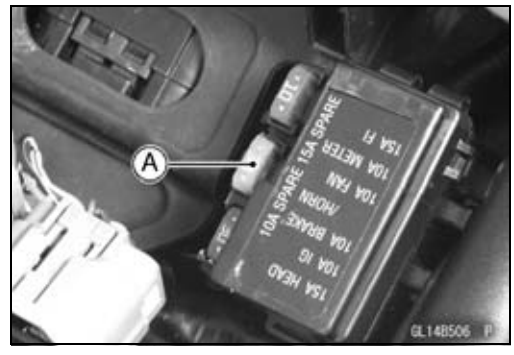
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Check the ABS fuse 30 A [A] in the fuse box 2 for blown.

★If the ABS fuse is blown, replace the fuse.

★If the fuse is not blown, go to next step.



Step 2

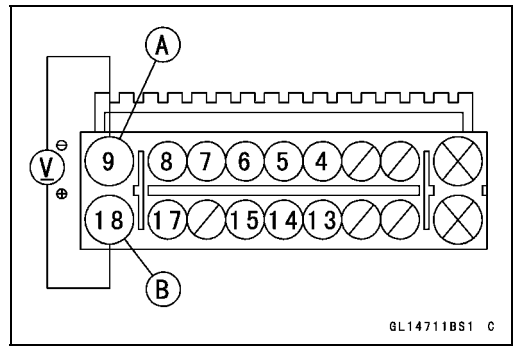
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 9 (BK/Y) (–) [A] and terminal 18 (R/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.

★If the battery voltage does not appear, repair or replace the main harness.

★If the battery voltage appeared, replace the ABS hydraulic unit.



Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code 25)

- Perform the Pre-Diagnosis Inspection 1 and 2.

Step 1

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).

★If the tire and/or wheel are in bad condition, correct them to the normal condition.

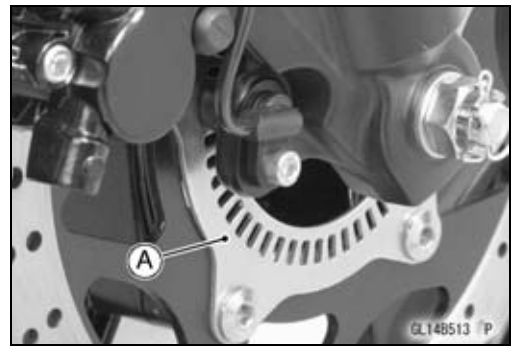
★If there is no problem, go to next step.

Step 2

- Visually inspect the sensor rotor [A] for missing teeth or clogging with foreign matter (see Wheel Rotation Sensor Rotor Inspection).

★Clean or correct the parts if necessary.

★If the all parts correct, go to next step.



Step 3
- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection).

★If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.

★If the air gap is within the specification, replace the ABS hydraulic unit.

ABS Motor Inspection (Service Code 35)
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code and then recheck the yellow ABS indicator light (LED).

★If same service code is indicated again, faulty ABS Motor in the ABS hydraulic unit. Replace the ABS hydraulic unit.

★If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1
- Measure the front or rear wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection).

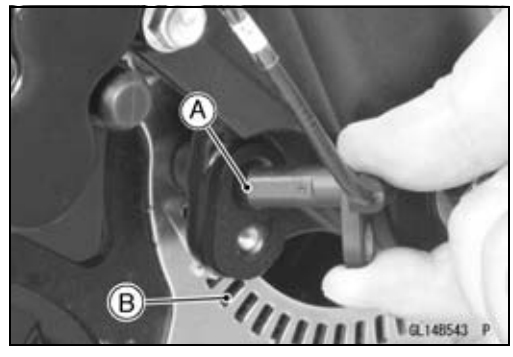
★If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.

★If the air gap is within the specification, go to next step.

Step 2
- Check that there is iron or other magnetic deposits between the front or rear wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).

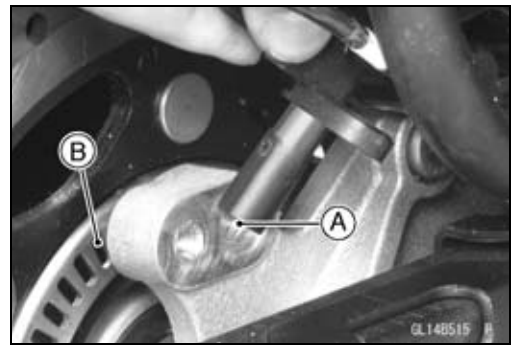
★If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.

★If all items are correct, go to next step.



Anti-Lock Brake System (Equipped Models)

Step 3



- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).

★If the tire and/or wheel are in bad condition, correct them if necessary and recheck.

★If all items are good condition, replace the ABS unit.

Front or Rear Wheel Rotation Sensor Wiring Inspection (Service Code 43)

○This code is indicates there is a trouble in the front or rear wheel rotation sensor.

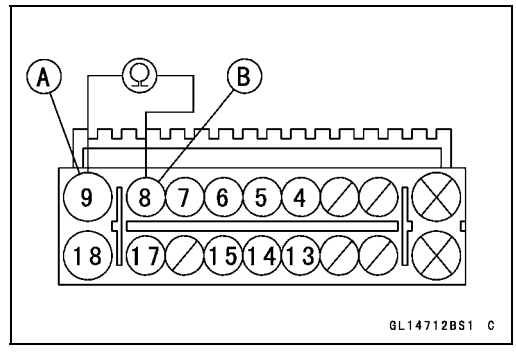
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 9 (BK/Y) [A] and terminal 8 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.

★If there is no continuity, go to step 2.

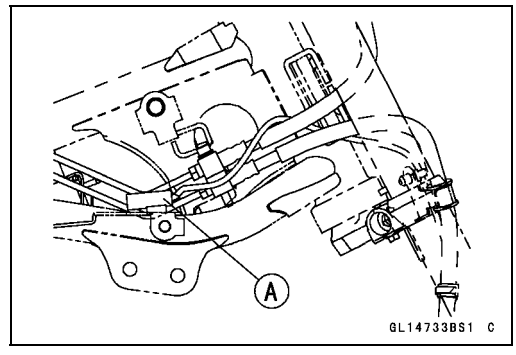


Step 1-1

- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK/Y) and terminal 8 (W/BK) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.

★If there is no continuity, replace the front wheel rotation sensor.

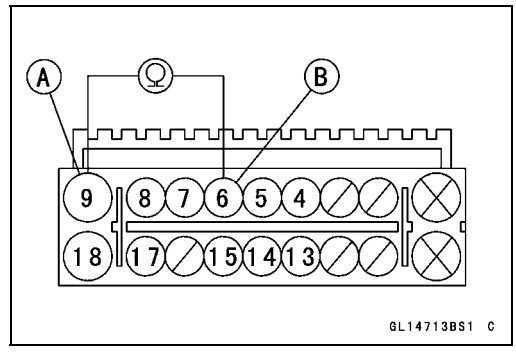


Step 2

- Check for continuity between the terminal 9 (BK/Y) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.

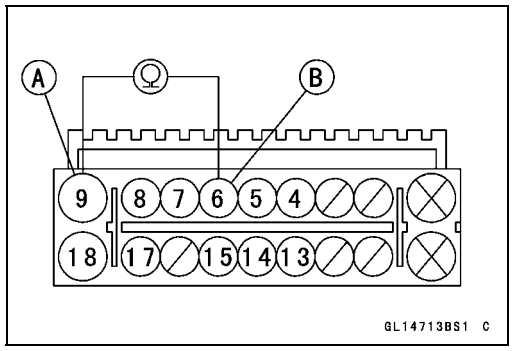
★If there is no continuity, go to step 3.



Anti-Lock Brake System (Equipped Models)

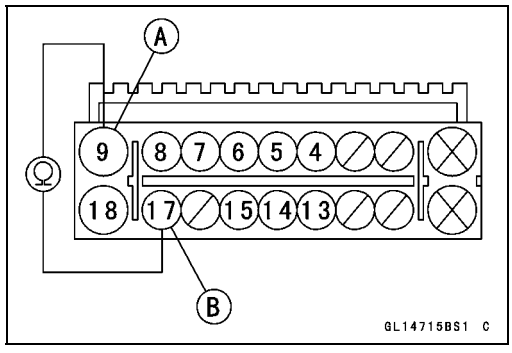
Step 2-1
- Disconnect the rear wheel rotation sensor connector.
- Recheck the continuity between the terminal 9 (BK/Y) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



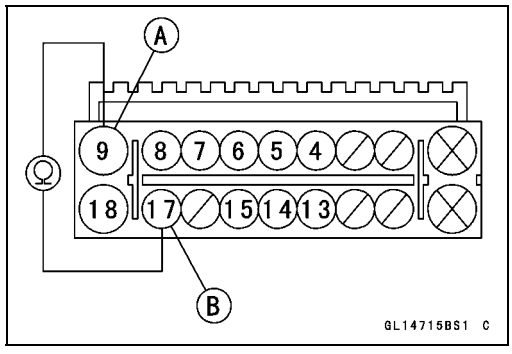
Step 3
- Connect the front wheel rotation sensor connector.
- Check for continuity between the terminal 9 (BK/Y) [A] and terminal 17 (BK/W) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 4.



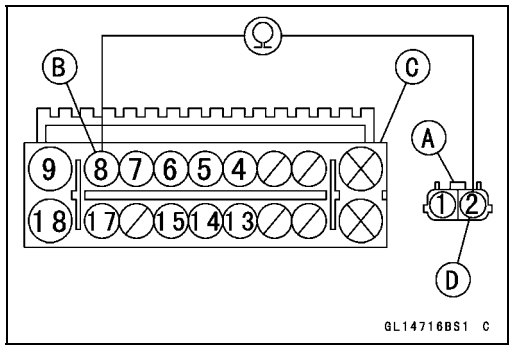
Step 3-1
- Disconnect the front wheel rotation sensor connector.
- Recheck the continuity between the terminal 9 (BK/Y) [A] and terminal 17 (BK/W) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the front wheel rotation sensor.



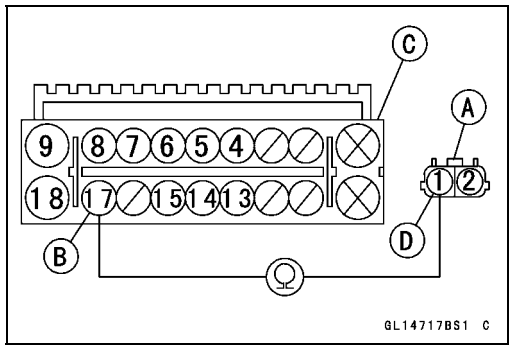
Step 4
- Disconnect the front wheel rotation sensor connector [A].
- Check for continuity between the terminal 8 (W/BK) [B] of the ABS hydraulic unit connector [C] and terminal 2 (W/BK) [D] of the front wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Step 5
- With disconnecting the front wheel rotation sensor connector [A], check for continuity between the terminal 17 (BK/W) [B] of the ABS hydraulic unit connector [C] and the 1 (BK/W) terminal [D] of the front wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Anti-Lock Brake System (Equipped Models)

Step 6

- Connect the front wheel rotation sensor connector.
- Connect the 4.5 ~ 5.0 V DC power (e.g. three AA dry battery in series [A]) between the terminal 17 (BK/W) (–) [B] and terminal 8 (W/BK) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

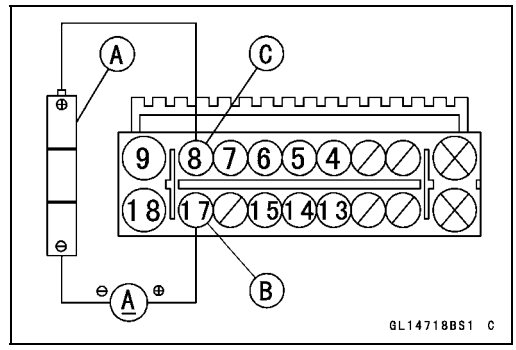
Special Tool - Hand Tester: 57001-1394

○Be careful not to reverse connection of the DC power polarity.

○The measured DC amperage should be within 3 ~ 17 mA.

★If measurement is abnormal, replace the front wheel rotation sensor.

★If measurement is normal, replace the ABS hydraulic unit.



Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)

○This code is indicates there is a trouble in the rear wheel rotation sensor. However the front and rear wheel rotation sensor inspection should be performed if this code is indicated.

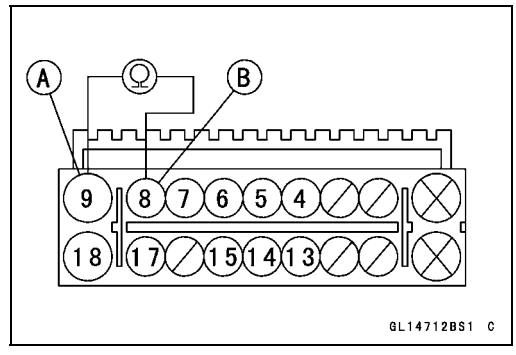
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 9 (BK/Y) [A] and terminal 8 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.

★If there is no continuity, go to step 2.

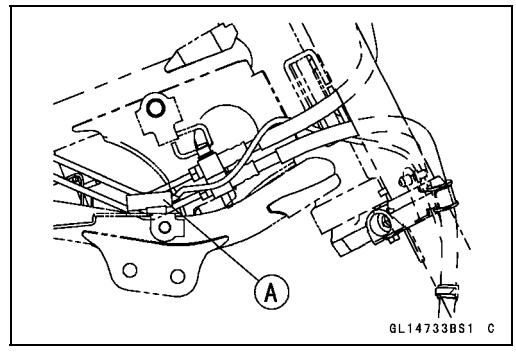


Step 1-1

- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK/Y) and terminal 8 (W/BK) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.

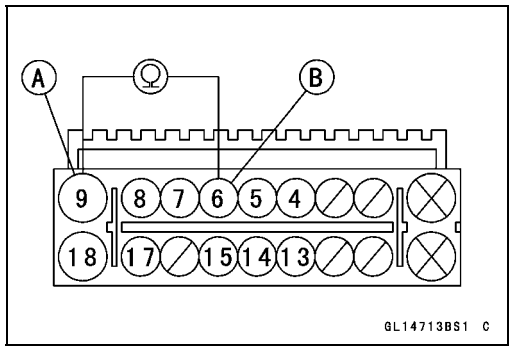
★If there is no continuity, replace the front wheel rotation sensor.



Anti-Lock Brake System (Equipped Models)

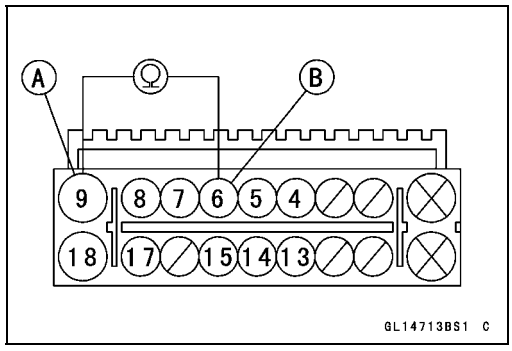
Step 2
- Check for continuity between the terminal 9 (BK/Y) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 3.



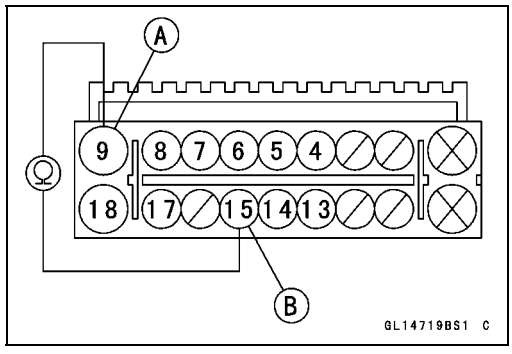
Step 2-1
- Disconnect the rear wheel rotation sensor connector.
- Recheck the continuity between the terminal 9 (BK/Y) [A] and terminal 6 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



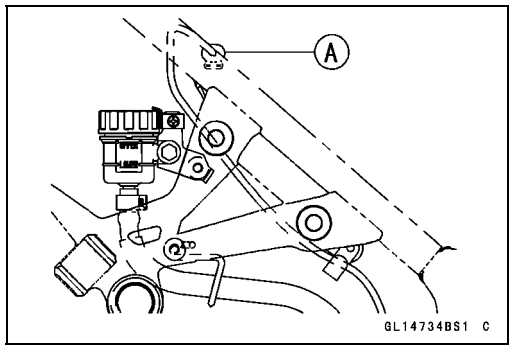
Step 3
- Connect the rear wheel rotation sensor connector.
- Check for continuity between the terminal 9 (BK/Y) [A] and terminal 15 (BK/O) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 4.



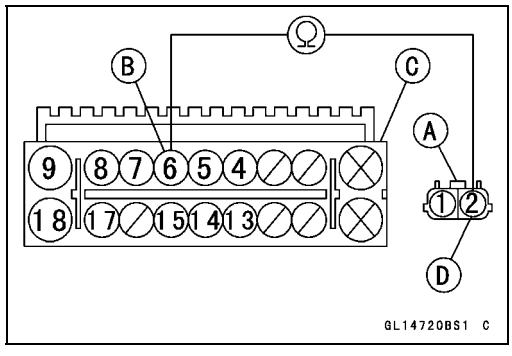
Step 3-1
- Disconnect the rear wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK/Y) and terminal 15 (BK/O) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



Step 4
- Disconnect the rear wheel rotation sensor connector [A].
- Check for continuity between the terminal 6 (W/G) [B] of the ABS hydraulic unit connector [C] and terminal 2 (W/G) [D] of the rear wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



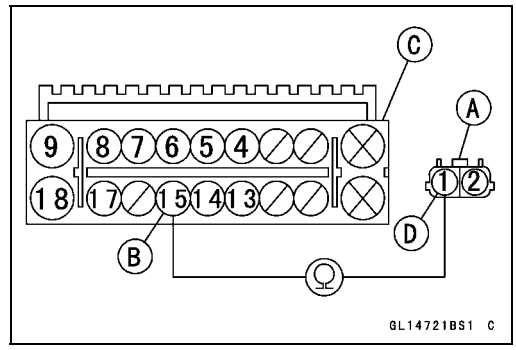
Anti-Lock Brake System (Equipped Models)

Step 5

- With disconnecting the rear wheel rotation sensor connector [A], check for continuity between the terminal 15 (BK/O) [B] of the ABS hydraulic unit connector [C] and terminal 1 (BK/O) [D] of the rear wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.

★If there is continuity, go to next step.



Step 6

- Connect the rear wheel rotation sensor connector.
- Connect the 4.5 ~ 5.0 V DC power (e.g. three AA dry battery in series [A]) between the terminal 15 (BK/O) (–) [B] and terminal 6 (W/G) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

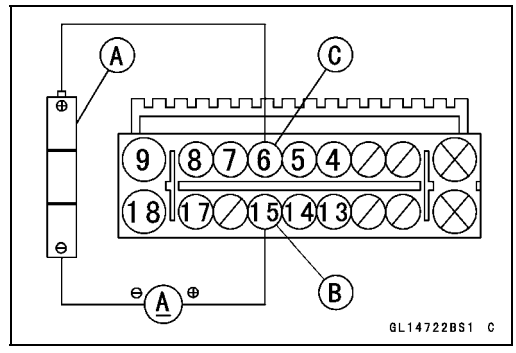
Special Tool - Hand Tester: 57001-1394

○Be careful not to reverse connection of the DC power polarity.

○The measured DC amperage should be within 3 ~ 17 mA.

★If measurement is abnormal, replace the rear wheel rotation sensor.

★If measurement is normal, replace the ABS hydraulic unit.



Power Supply Voltage Abnormal Inspection (Service Code 52: Low Voltage) (Service Code 53: High Voltage)

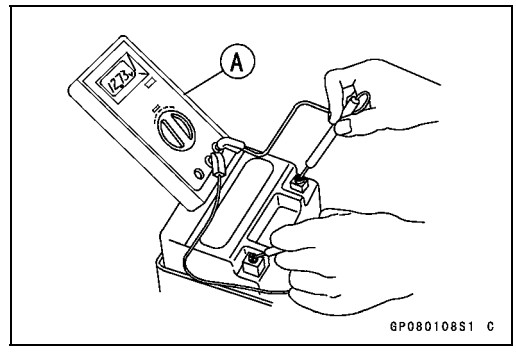
Step 1

- Measure the battery terminal voltage using a voltmeter [A].

○The battery voltage should be within 10 ~ 16 V.

★If the voltage is not within the specifications, recharge or replace the battery.

★If the voltage within the specifications, go to next step.

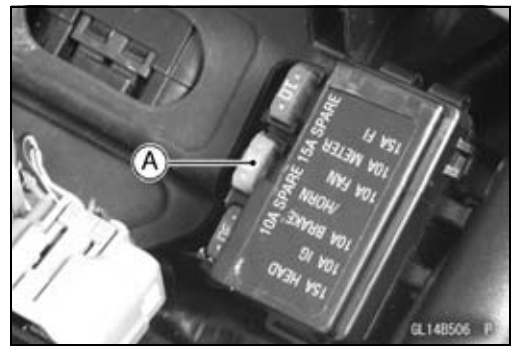


Step 2

- Check the ABS fuse 30A [A] in the fuse box 2 for blown.

★If the ABS fuse is blown, replace the fuse.

★If the fuse is not blown, go to next step.

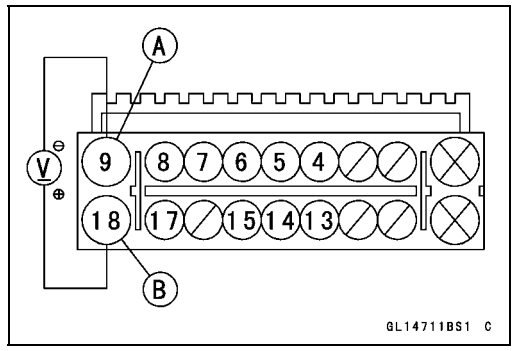


Anti-Lock Brake System (Equipped Models)

Step 3
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 9 (BK/Y) (–) [A] and terminal 18 (R/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

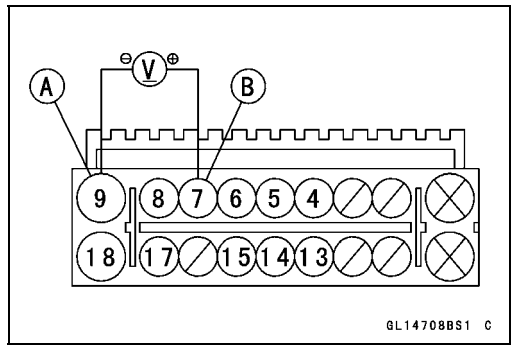
○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



Step 4
- Check the voltage between the terminal 9 (BK/Y) (–) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

Special Tool - Hand Tester: 57001-1394

○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.
★If the battery voltage not appeared, repair or replace the main harness.
★If the battery voltage does appear, replace the ABS hydraulic unit.



ABS Hydraulic Unit Internal Error Inspection (Service Code 55)

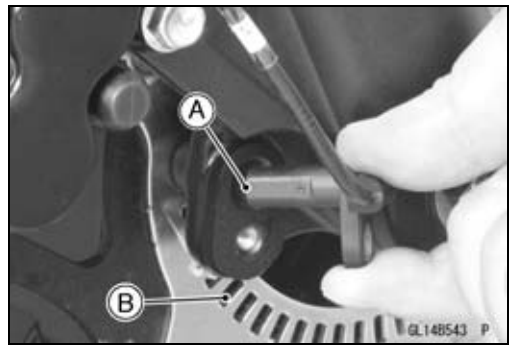
○This service code indicates there is an internal error for the ECU integrated with the ABS hydraulic unit regarding the wheel speed detection.
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1
- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection).

★If the air gap is not within the specification, correct the air gap accordingly.
★If the air gap is within the specification, go to next step.

Step 2
- Check that there is iron or other magnetic deposits between the both wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.
★If all items are correct, go to next step.

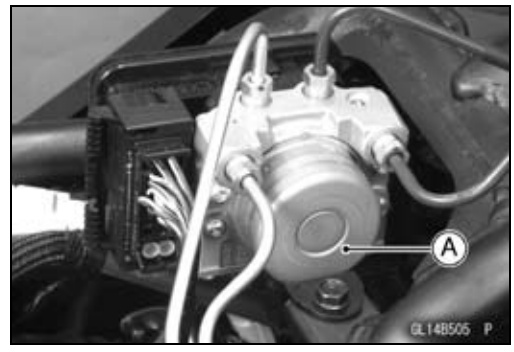


Step 3
- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).

★If the tire and/or wheel are in bad condition, correct them to the normal condition.
★If there is no problem, replace the ABS hydraulic unit.

Anti-Lock Brake System (Equipped Models)

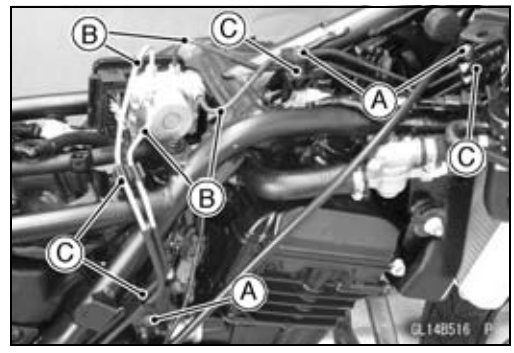
ABS Hydraulic Unit Removal



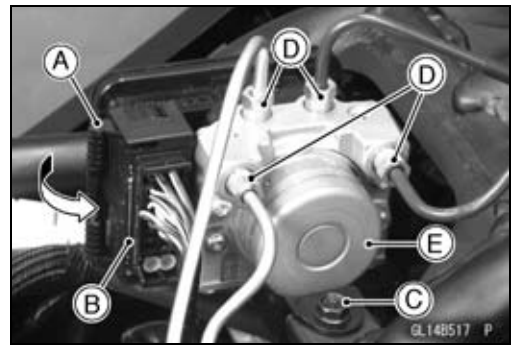
NOTICE

The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.
Be careful not to get water or mud on the ABS hydraulic unit.

- Drain the brake fluid from the front and rear brake lines.
  - Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.
  - Be sure to place a cloth under the ABS hydraulic unit.



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Turn the ignition switch off.
- Remove the clamp bolts [A] to free the brake pipes [B] from the clamps [C].



- Pull the lever [A] to disconnect the ABS hydraulic unit connector [B].

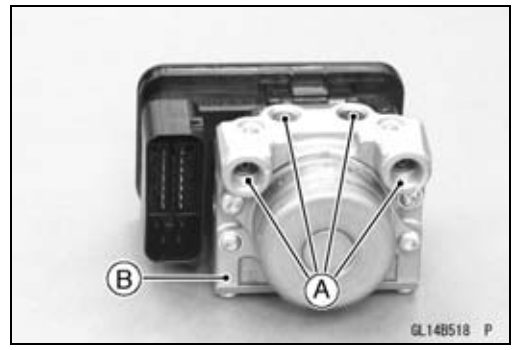
NOTICE

To protect the ABS hydraulic unit from the electrical surge, always disconnect the ABS hydraulic unit connector while the ignition switch is turned off.

- Loosen the ABS hydraulic unit mounting bolts [C] before disconnecting the brake pipes.
- Loosen the brake pipe joint nuts [D] fully using the flare nut wrench.
- Remove the ABS hydraulic unit [E] from the frame.

NOTE

Be careful not to bend the brake pipe while removing the ABS hydraulic unit.



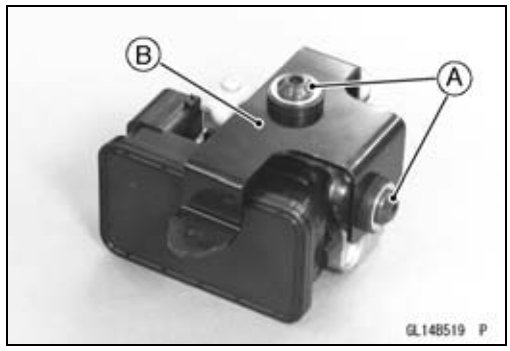
- Plug the port [A] on the ABS hydraulic unit [B] to prevent entering a foreign matter into the unit.
- Wrap the brake pipe openings with a vinyl bag to prevent brake fluid leakage and entering a foreign matter into the hydraulic system.

NOTICE

- **Do not allow entering a foreign matter into the hydraulic system while disconnecting the hydraulic lines.**
- **Brake fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.**

Anti-Lock Brake System (Equipped Models)

- Remove:
  Bolts [A] and Washers
  Bracket [B]

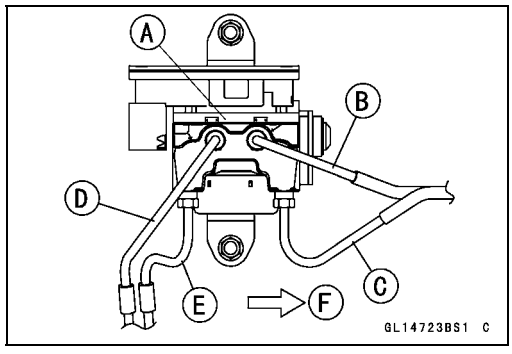


NOTICE

The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.

ABS Hydraulic Unit Installation

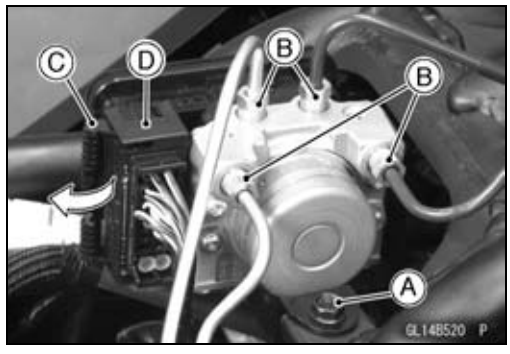
- Install the bracket to the ABS hydraulic unit [A] if removed.
- Position the ABS hydraulic unit on the frame.
- Install the brake pipes to the ABS hydraulic unit and screw the flare nut loosely.
  To Front Calipers [B]
  To Front Master Cylinder [C]
  To Rear Caliper [D]
  To Rear Master Cylinder [E]
  Front [F]



- Install the ABS hydraulic unit mounting bolts [A].
- Tighten the brake pipe joint nuts [B] with the flare nut wrench.

Torque - Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)

- Push the lever [C] to connect the ABS hydraulic unit connector [D].
- Install the removed parts (see appropriate chapters).
- Fill the ABS hydraulic system with recommend brake fluid (see Brake Fluid Change in the Periodic Maintenance chapter).



ABS Hydraulic Unit Inspection

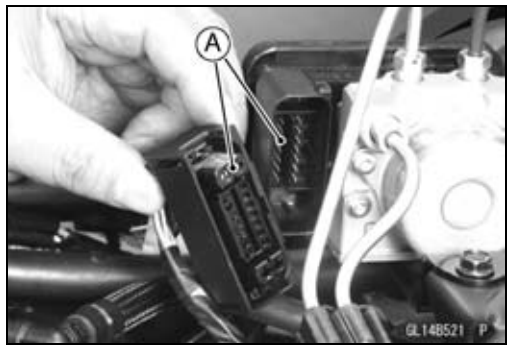
- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the ABS hydraulic unit.

★Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.

- Visually inspect the connector terminals [A].

★Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.

★If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.



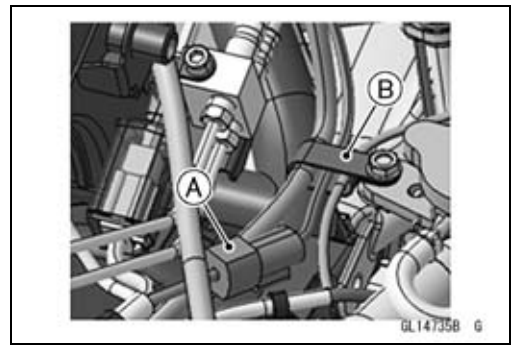
Anti-Lock Brake System (Equipped Models)

Front Wheel Rotation Sensor Removal

NOTICE

The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.
Do not try to disassemble or repair the wheel rotation sensor.

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the front wheel rotation sensor connector [A] and clear the sensor lead from the clamp [B].



- Clear the sensor lead from the clamp [A].

- Remove:
  Clamps [A]
  Bolt [B]
  Front Wheel Rotation Sensor [C]

Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

○Apply a non-permanent locking agent to the threads of the wheel rotation sensor bolt.

○Tighten:

Torque - Front Wheel Rotation Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

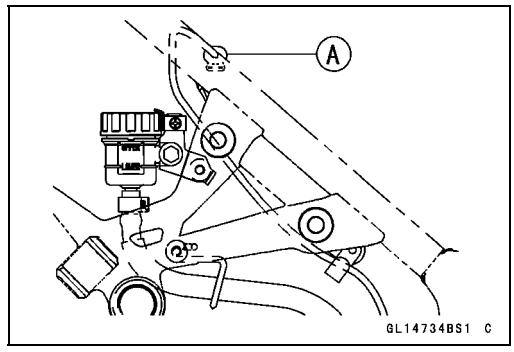
Anti-Lock Brake System (Equipped Models)

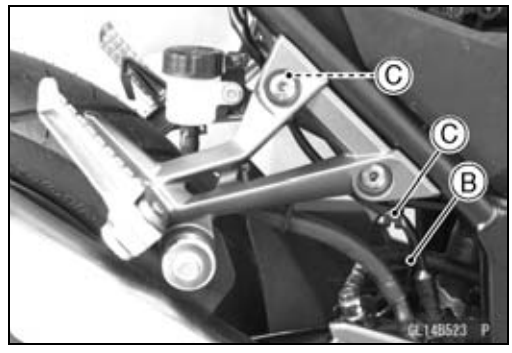
Rear Wheel Rotation Sensor Removal

NOTICE

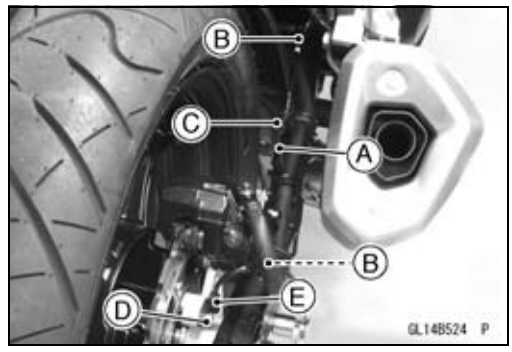
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.
Do not try to disassemble or repair the wheel rotation sensor.

- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
- Disconnect the rear wheel rotation sensor connector [A] and clear the sensor lead [B] from the clamps [C].





- Clear the sensor lead [A] from the clamps [B].
- Remove:
  Grommet [C]
  Bolt [D]
  Rear Wheel Rotation Sensor [E]



Rear Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

○Apply a non-permanent locking agent to the threads of the wheel rotation sensor bolt.

○Tighten:

Torque - Rear Wheel Rotation Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

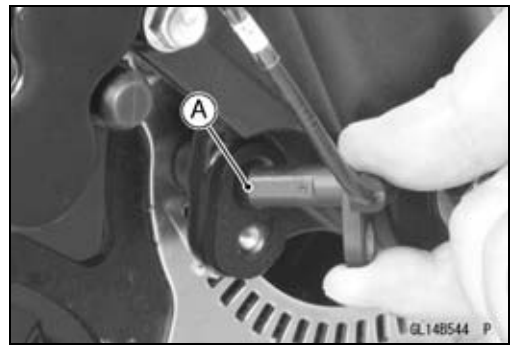
Anti-Lock Brake System (Equipped Models)

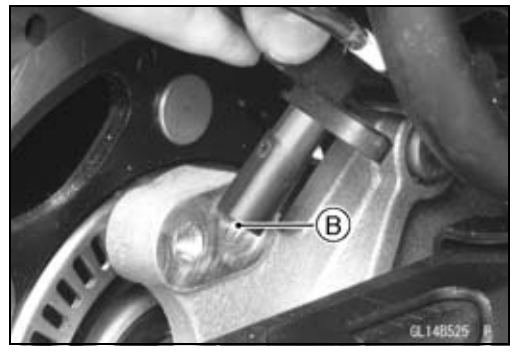
Wheel Rotation Sensor Inspection

- Remove the front wheel rotation sensor [A] from the front fork.
- Remove the rear wheel rotation sensor [B] from the caliper bracket.
- Visually inspect the wheel rotation sensors.

★Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.

★If electrical failure is suspected on the sensors, perform the electrical check (see Service Code 43 Step 6 for front sensor or Service Code 45 Step 6 for rear sensor).





Wheel Rotation Sensor Air Gap Inspection

- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Measure the air gap between the sensor and sensor rotor at several points.

Thickness Gauge [A]

Air Gap

Standard:

Front	**0.1 ~ 1.5 mm (0.004 ~ 0.060 in.)**
Rear	**0.1 ~ 1.5 mm (0.004 ~ 0.060 in.)**

NOTE

○*The sensor air gap cannot be adjusted.*

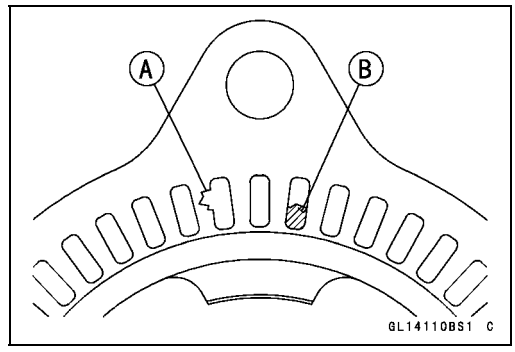
★If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor, sensor rotor and sensor installation condition (see Wheel Rotation Sensor Inspection).

Wheel Rotation Sensor Rotor Inspection

- Visually inspect the wheel rotation sensor rotor.

★If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.

★If there is iron or other magnetic deposits [B], remove the deposits.



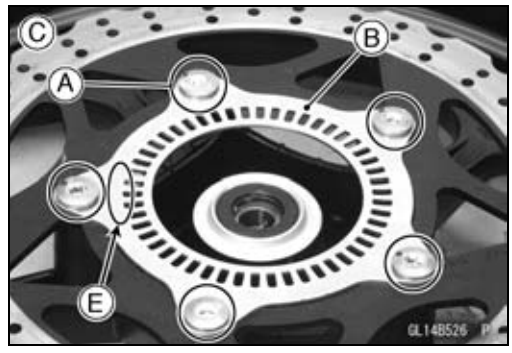
Anti-Lock Brake System (Equipped Models)

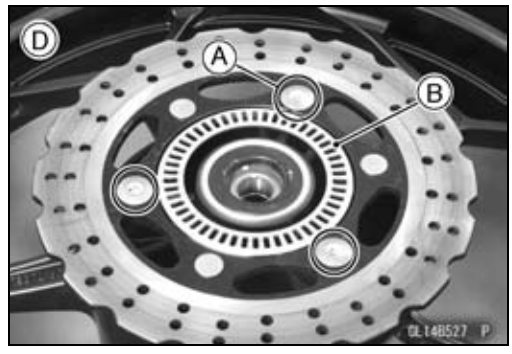
- If necessary, replace the sensor rotor as follows.
- Remove:
  Wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter)
  Brake Disc Mounting Bolts [A]
  Sensor Rotor [B]
  Front Wheel [C]
  Rear Wheel [D]

○The rear sensor rotor can not be removed from the rear brake disc.

○Install the front sensor rotor with “577” mark [E] side facing out.

- Install the removed parts (see appropriate chapters).





Fuse Removal

- Refer to the Fuse Box Fuse Removal in the Electrical System chapter.

Fuse Installation

- If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage (see Fuse Installation in the Electrical System chapter).

Fuse Inspection

- Refer to the Fuse Inspection in the Electrical System chapter.

Suspension

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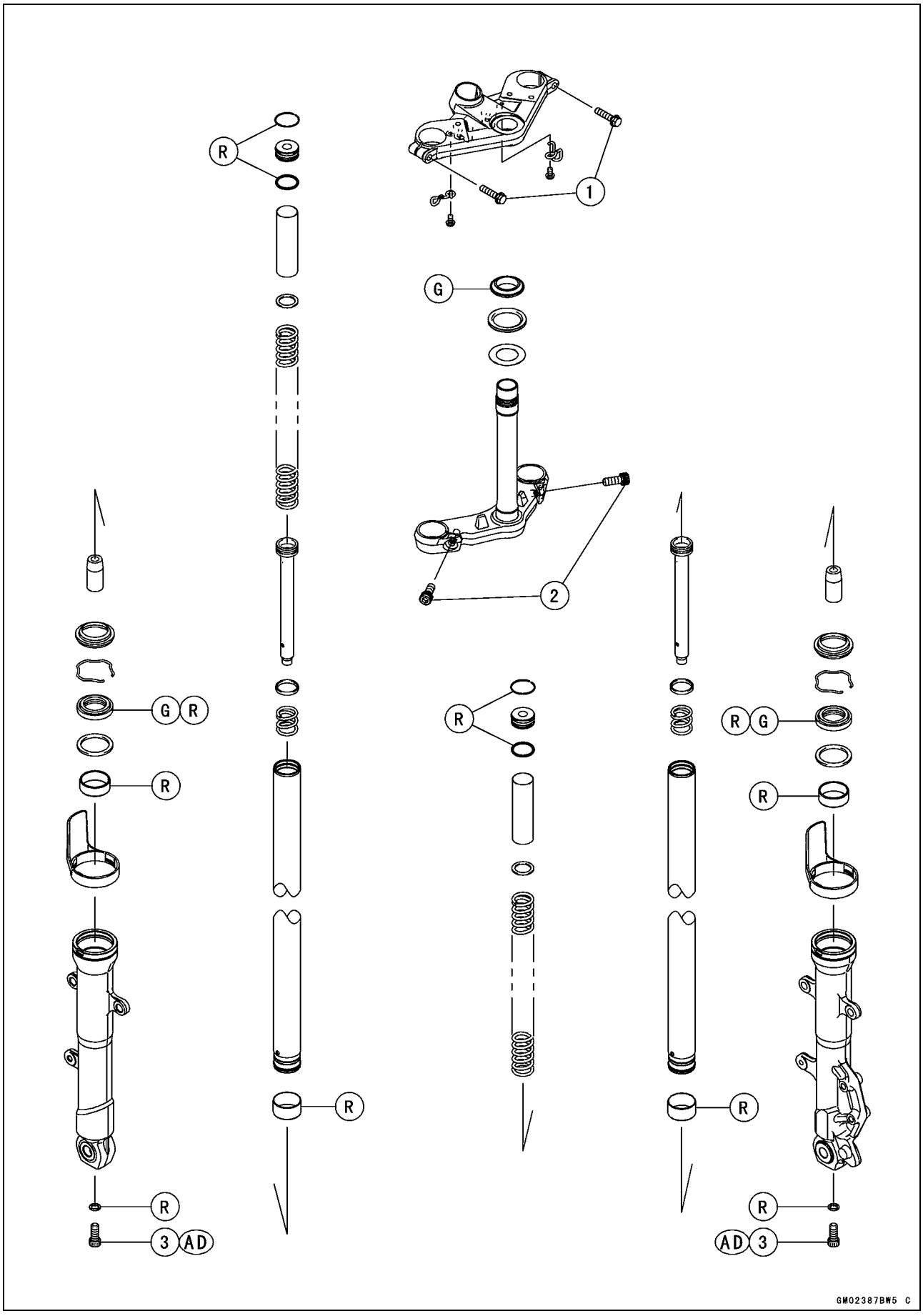
Exploded View

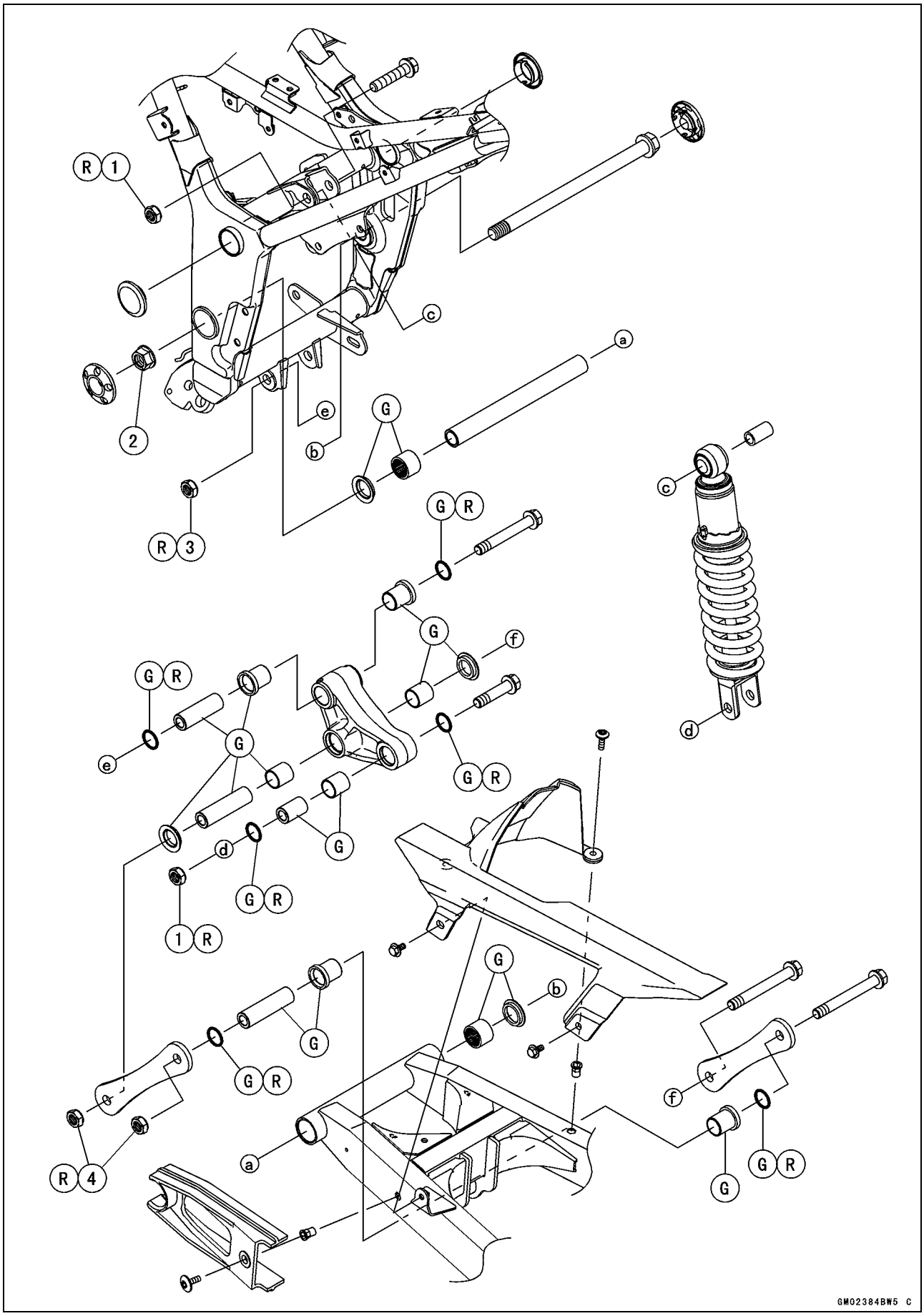


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Upper Clamp Bolts	20	2.0	15	
2	Front Fork Lower Clamp Bolts	30	3.1	22	
3	Front Fork Bottom Allen Bolts	20	2.0	15	AD

AD: Apply adhesive.
G: Apply grease.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Nuts	59	6.0	44	R
2	Swingarm Pivot Shaft Nut	98	10.0	72	
3	Rocker Arm Nut	59	6.0	44	R
4	Tie-Rod Nuts	59	6.0	44	R

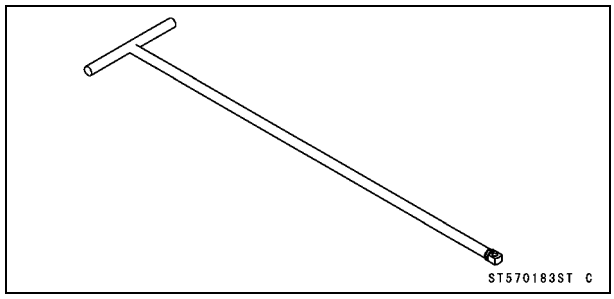
G: Apply grease.
R: Replacement Parts

Specifications

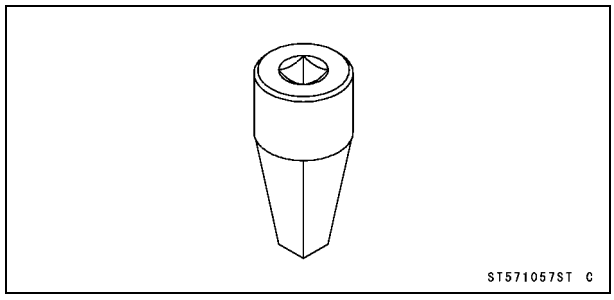
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ37 mm (1.5 in.)
Air Pressure	Atmospheric pressure (Non-adjustable)
Rebound Damper Setting	Non-adjustable
Fork Spring Preload Setting	Non-adjustable
Fork Oil:	
Recommended Oil	SHOWA SS-8 or equivalent
Amount	Approx. 316 mL (10.7 US oz.) (when changing oil) 372 ±2.5 mL (12.6 ±0.085 US oz.) (after disassembly and completely dry)
Fork Oil Level	100 ±2 mm (3.94 ±0.08 in.) (fully compressed, without fork spring, below from the top of the inner tube)
Fork Spring Free Length	420.5 mm (16.56 in.) (Service Limit: 412 mm (16.22 in.))
Rear Shock Absorber	
Rebound Damper Setting	Non-adjustable
Spring Preload Setting	2nd position (Adjustable range: 1st ~ 5th position)
Gas Pressure	980 kPa (10 kgf/cm², 142 psi, Non-adjustable)

Special Tools

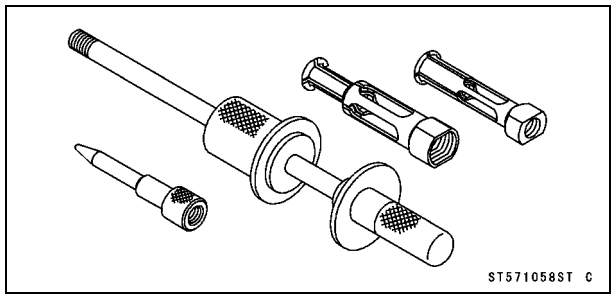
Fork Cylinder Holder Handle:
57001-183



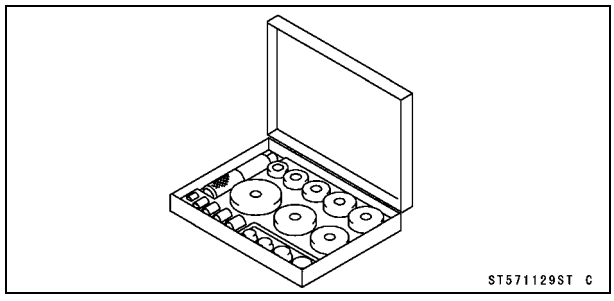
Fork Cylinder Holder Adapter:
57001-1057



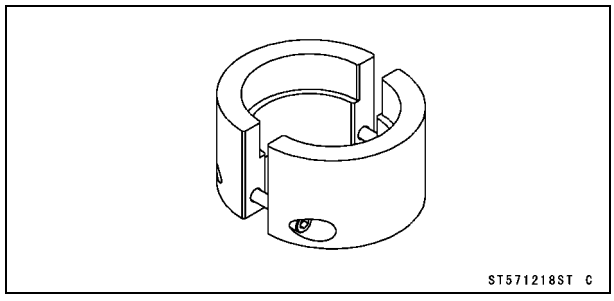
Oil Seal & Bearing Remover:
57001-1058



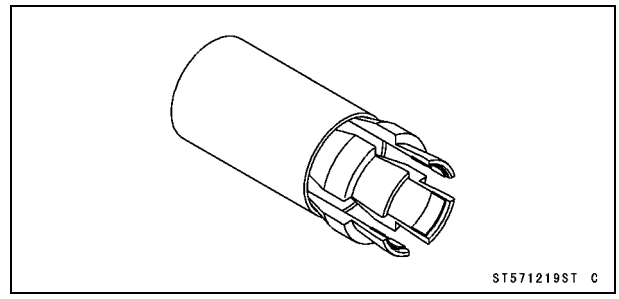
Bearing Driver Set:
57001-1129



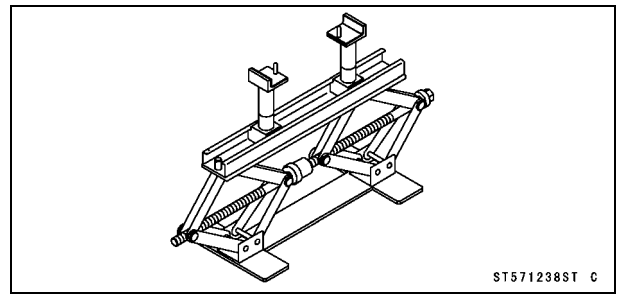
Fork Outer Tube Weight:
57001-1218



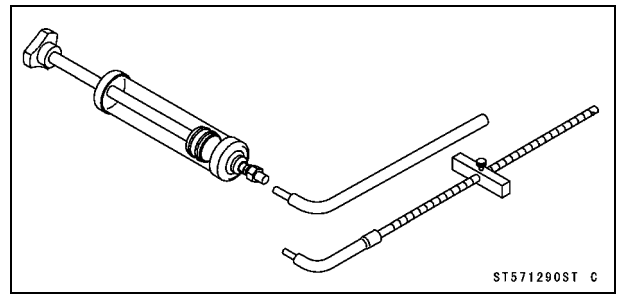
Front Fork Oil Seal Driver:
57001-1219



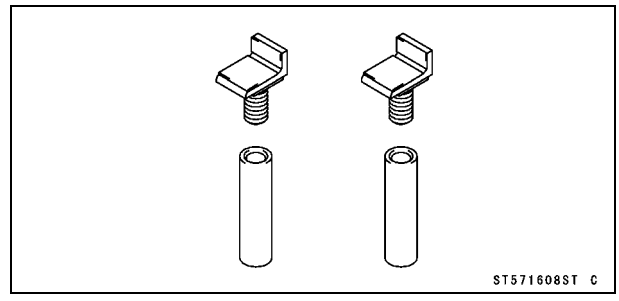
Jack:
57001-1238



Fork Oil Level Gauge:
57001-1290

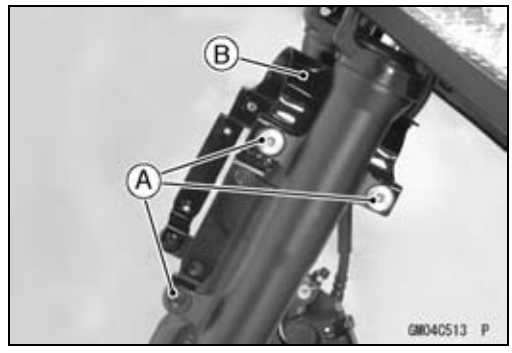


Jack Attachment:
57001-1608

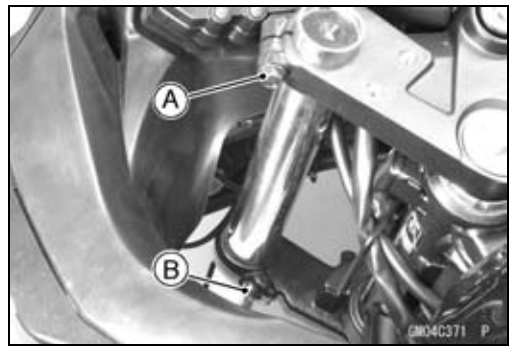


Front Fork

Front Fork Removal (Each Fork Leg)

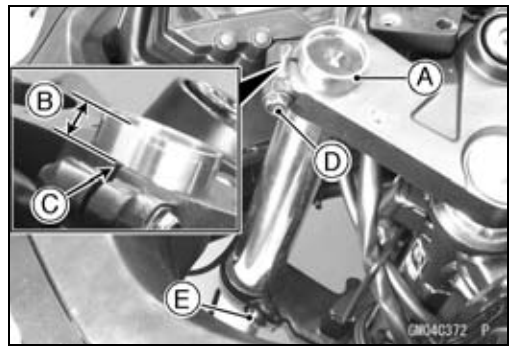


- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  Front Fender (see Front Fender Removal in the Frame chapter)
  Bolts [A] (Both Sides)
  Bracket [B]



- Remove the handlebar (see Handlebar Removal in the Steering chapter).
- Loosen the front fork upper [A] and lower [B] clamp bolts.
- With a twisting motion, remove the fork leg down and out.

Front Fork Installation (Each Fork Leg)

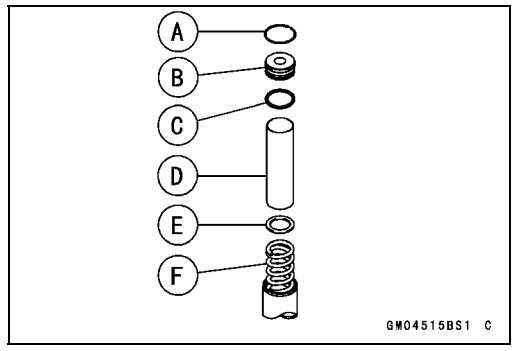


- Insert the fork leg [A] through the steering stem and steering stem head.
- Adjust the fork height [B] measured at the edge of the slit [C] on the steering stem head is approximate 12 mm (0.47 in.).
- Tighten:

Torque - Front Fork Upper Clamp Bolts [D]: 20 N·m (2.0 kgf·m, 15 ft·lb)
Front Fork Lower Clamp Bolts [E]: 30 N·m (3.1 kgf·m, 22 ft·lb)

- Install the removed parts (see appropriate chapters).

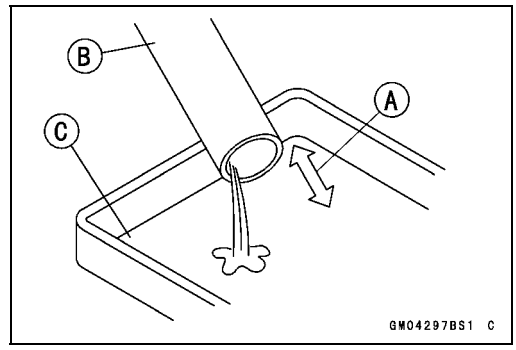
Front Fork Oil Change



- Remove:
  Front Fork (see Front Fork Removal)
  Snap Ring [A] (see Front Fork Disassembly)
  Top Plug [B] with O-ring [C]
  Collar [D]
  Fork Spring Seat [E]
  Fork Spring [F]

Front Fork

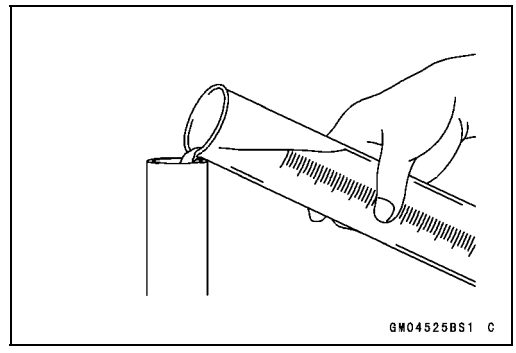
● Compress [A] the fork [B] upside down to draw out the oil into the suitable container [C].



● Hold the fork tube upright, pour in the type and amount of fork oil specified.

Suspension Oil - SHOWA SS-8: 44091-0007

Fork Oil
Amount (Per Side):
When changing oil:
Approx. 316 mL (10.7 US oz.)
After disassembly and completely dry:
372 ±2.5 mL (12.6 ±0.085 US oz.)



NOTE

○*Move the outer tube up and down a few times to remove the air that is trapped in the fork oil in order to stabilize the oil level.*

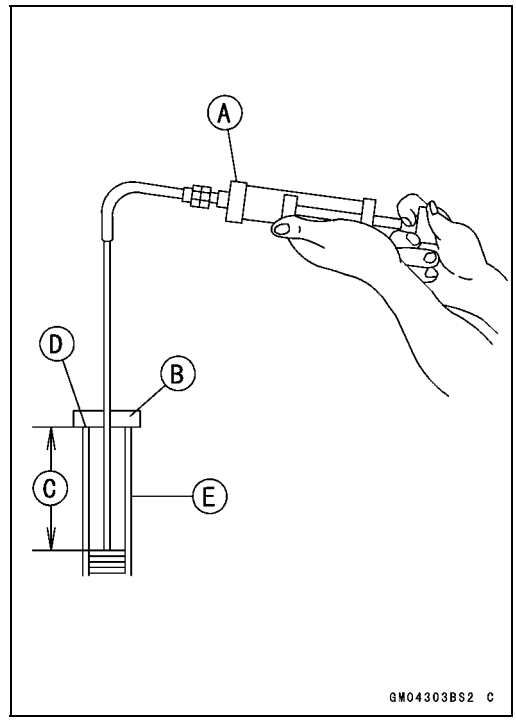
● Hold the outer tube vertically in a vise and compress the fork completely.
● Wait until the oil level stabilizes.
● Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

Special Tool - Fork Oil Level Gauge: 57001-1290

○Set the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.
○A correct measurement can not be obtained unless the level gauge pipe is placed in the center of the inner tube.

Fork Oil Level (fully compressed, without fork spring)
Standard: 100 ±2 mm (3.94 ±0.08 in.)

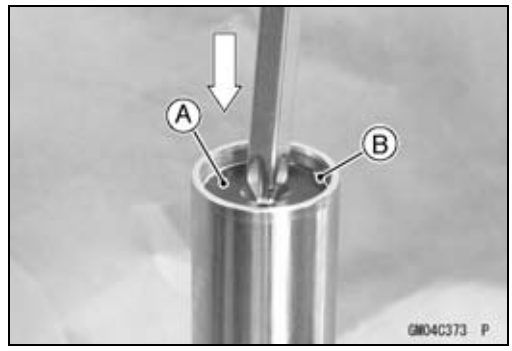
○Place the stopper of the level gauge at the top [D] of the inner tube [E] and pull the handle slowly to draw out the excess oil from fork into the gauge, thus attaining the standard level.
★If not oil is drawn out, there is not enough oil in the fork. Pour in some more oil and measure again.
● Install the removed part (see appropriate chapter).
● Install the front fork (see Front Fork Installation).



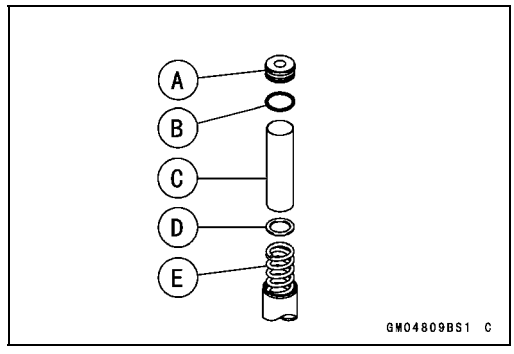
Front Fork

Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- To remove the top plug [A], remove the snap ring [B] while pushing down the top plug with a suitable tool.



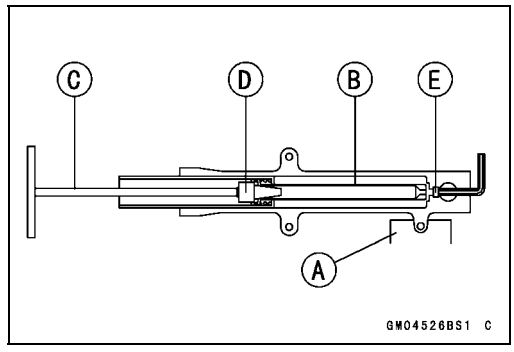
- Remove:
  Top Plug [A] with O-ring [B]
  Collar [C]
  Fork Spring Seat [D]
  Fork Spring [E]
- Replace the O-ring with a new one.



- Drain the fork oil (see Front Fork Oil Change).
- Hold the fork leg horizontally in a vise [A].
- Hold the cylinder unit [B] using the special tools.

Special Tools - Fork Cylinder Holder Handle [C]: 57001-183
Fork Cylinder Holder Adapter [D]: 57001 -1057

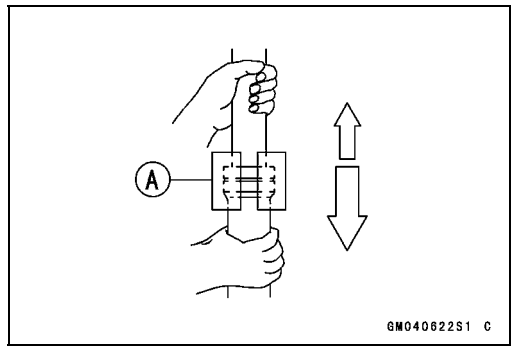
- Remove the Allen bolt [E] and gasket from the bottom of the outer tube.
- Remove the cylinder unit and spring.



- Remove the following from the top of the outer tube.
  Fork Guard [A]
  Dust Seal [B]
  Retaining Ring [C]

- Use the fork outer tube weight [A] to separate the inner tube from the outer tube. Holding the inner tube by hand in a vertical position, pull down the outer tube several times to pull out the inner tube.

Special Tool - Fork Outer Tube Weight: 57001-1218

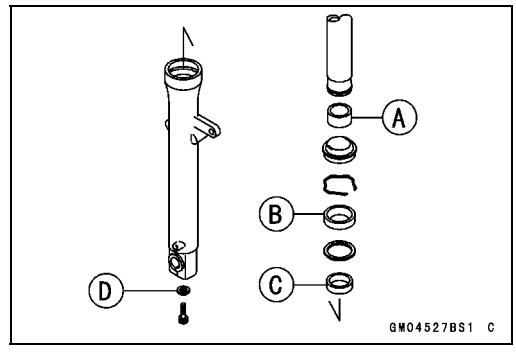


Front Fork

- Remove:
  Oil Seal
  Washer
  Outer Guide Bushing
  Inner Guide Bushing
  Cylinder Base

Front Fork Assembly

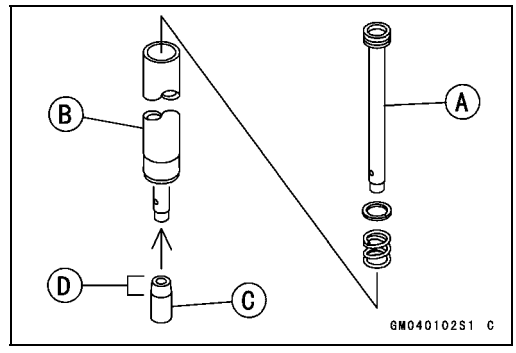
- Replace the following parts with new ones.
  Inner Guide Bushing [A]
  Oil Seal [B]
  Outer Guide Bushing [C]
  Bottom Allen Bolt Gasket [D]
- Install the new inner guide bushing to the groove on the inner tube.



- Put the cylinder unit [A] with the spring into the inner tube [B] protruding from the inner tube, and install the cylinder base [C] onto the bottom end of the cylinder unit.

○Install the cylinder base with the tapered end [D] facing upward.

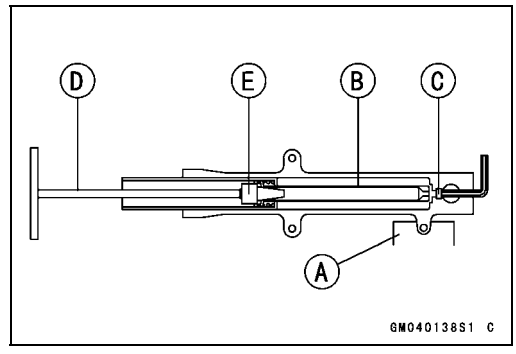
- Install the inner tube, cylinder unit, and cylinder base as a set into the outer tube.



- Install a new bottom Allen bolt gasket.
- Apply a adhesive (Cemedine #575 or equivalent) to the threads of the bottom Allen bolt.
- Hold the outer tube in a vise [A], stop the cylinder unit [B] with the special tools, then tighten the Allen bolt [C].

Special Tools - Fork Cylinder Holder Handle [D]: 57001-183
Fork Cylinder Holder Adapter [E]: 57001 -1057

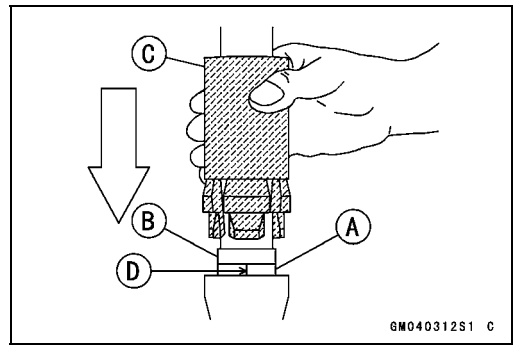
Torque - Front Fork Bottom Allen Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)



- Install the new guide bushing [A] with a use one [B] on it by tapping the use one with the fork oil seal driver [C].

○The slit [D] of the bushing should face toward the side of the motorcycle.

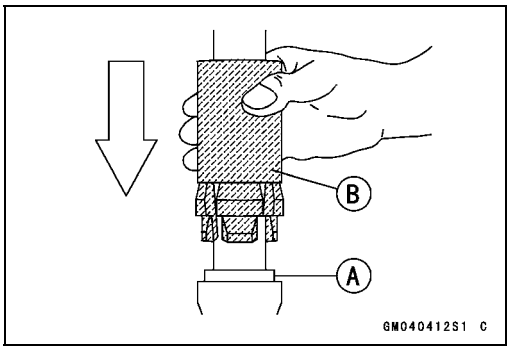
Special Tool - Front Fork Oil Seal Driver: 57001-1219



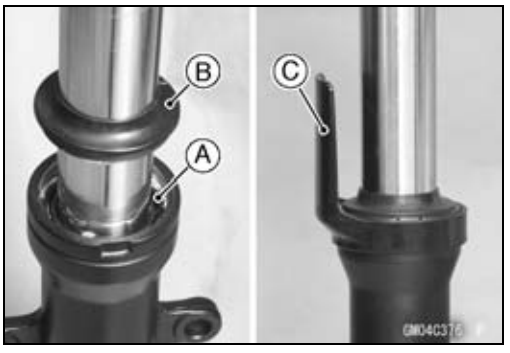
Front Fork

- Apply grease to the oil seal lips, and install the washer and the oil seal [A] into the outer tube.

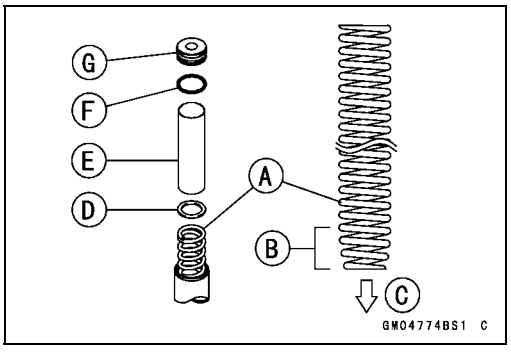
  Special Tool - Front Fork Oil Seal Driver [B]: 57001-1219



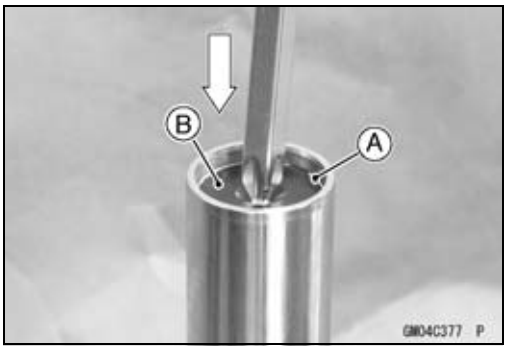
- Install the retaining ring [A] on the outer tube.
- Install the dust seal [B] and fork guard [C].
- Pour in the specified type of oil (see Front Fork Oil Change).



- Wipe off fork oil from the fork spring [A] thoroughly.
- Install the fork spring with its tapered end [B] facing to the downward [C].
- Install:
  Fork Spring Seat [D]
  Collar [E]
  O-ring [F] (replace with new one)
  Top Plug [G]



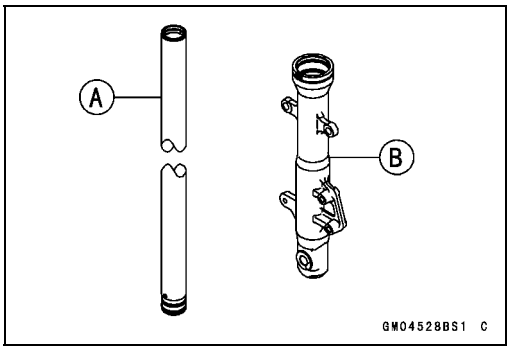
- Install the new snap ring [A] into the groove on the inner tube while depressing the top plug [B].
- Make sure that the snap ring is properly installed.
- Install the front fork (see Front Fork Installation).



Inner Tube, Outer Tube Inspection

- Visually inspect the inner tube [A] for damage.
- Temporarily assemble the inner and outer [B] tubes, and pump them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.



⚠ WARNING

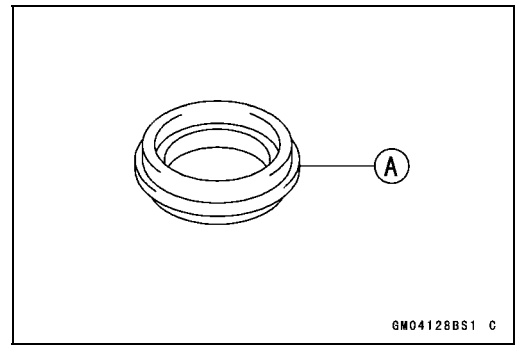
A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Front Fork

Dust Seal Inspection

- Inspect the dust seal [A] for any signs of deterioration or damage.

★Replace it if necessary.



Fork Spring Tension Inspection

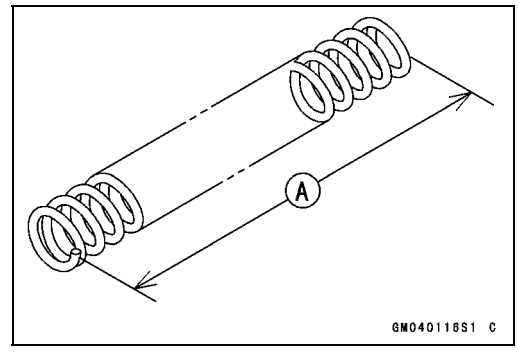
- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

Fork Spring Free Length

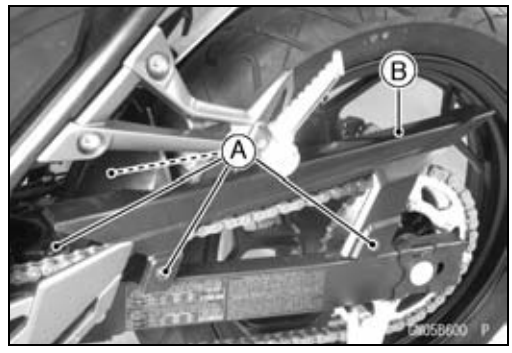
Standard: 420.5 mm (16.56 in.)

Service Limit: 412 mm (16.22 in.)

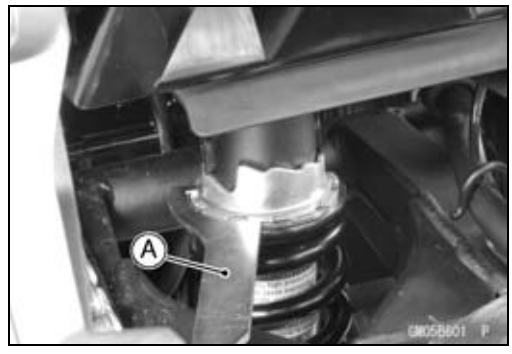


Rear Shock Absorber

Spring Preload Adjustment



- Remove the bolts [A] and chain cover [B].



- Using the wrench [A] from the tool kit, turn the adjusting nut to adjust the spring preload.

○The standard adjuster setting is 2nd position.

Spring Preload Setting

Standard Position: 2nd position

Adjustable Range: 1st ~ 5th position

★If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Soft	Light	Good	Low
↑	↑	↑	↑	↑
↓	↓	↓	↓	↓
5th	Hard	Heavy	Bad	Highway

Rear Shock Absorber Removal

- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.

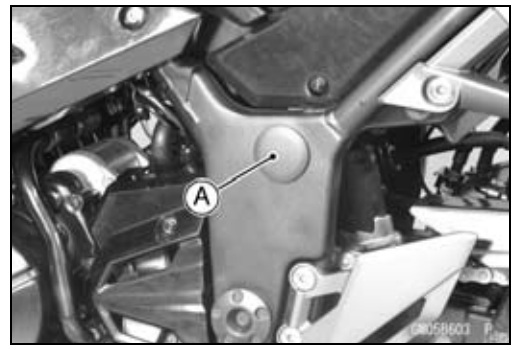
- Remove the lower fairings (see Lower Fairing in the Frame chapter).
- Raise the rear wheel off the ground with jack.

Special Tools - Jack: 57001-1238

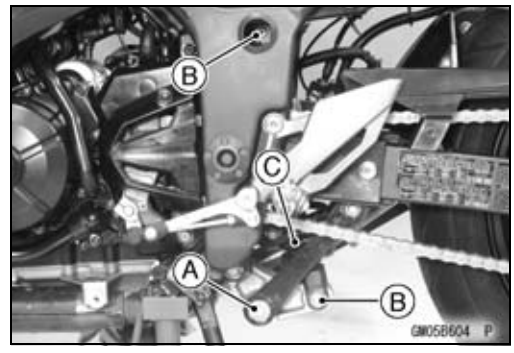
Jack Attachment: 57001-1608

Rear Shock Absorber

● Remove the cap [A] (both sides).



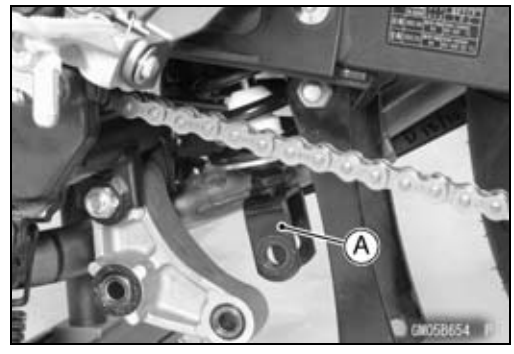
● Remove:
Tie-Rod Lower Nut [A] and Bolt
Rear Shock Absorber Nuts [B] and Bolts
● Remove the shock absorber [C] from downside.



Rear Shock Absorber Installation

● Install the rear shock absorber [A].
● Replace:
Rear Shock Absorber Nuts
Tie-Rod Nuts
O-rings
● Apply grease to the O-ring.
● Tighten:

Torque - Rear Shock Absorber Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)



● Install the removed parts (see appropriate chapters).

Rear Shock Absorber Inspection

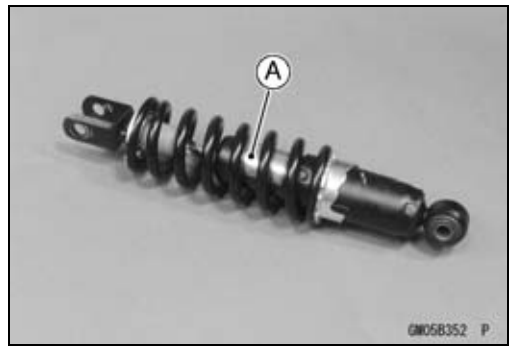
● Remove the rear shock absorber (see Rear Shock Absorber Removal).
● Visually inspect the following items.
Oil Leakage
Crack or Dent
★If there is any damage to the rear shock absorber, replace it.
● Visually inspect the rubber bushing [A].
★If it show any signs of damage, replace it.

Rear Shock Absorber

Rear Shock Absorber Scrapping

⚠ WARNING

Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode.
Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may below out bits of drilled metal when the hole opens.

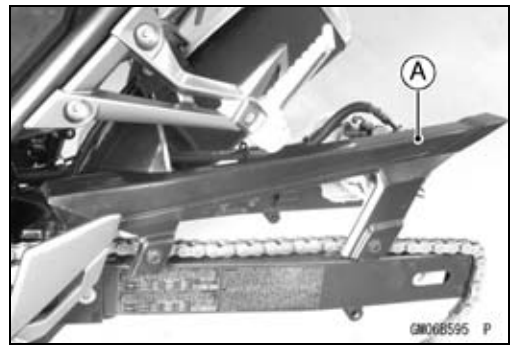


- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the cylinder of the shock absorber using about 2 mm (0.08 in.) drillbit.

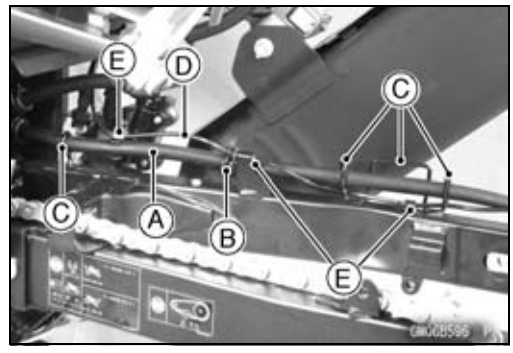
Swingarm

Swingarm Removal

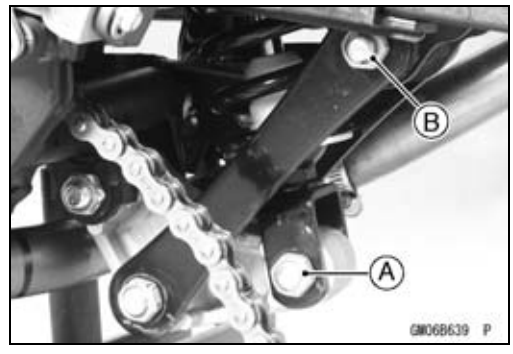
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Chain Cover [A] (see Spring Preload Adjustment)



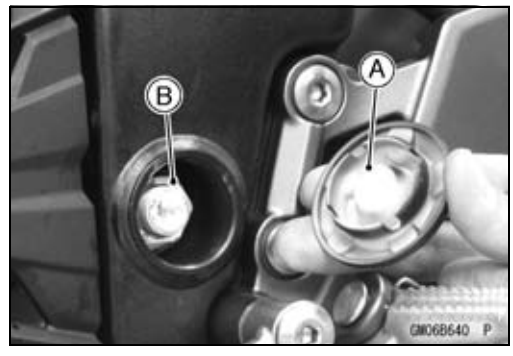
- Remove the brake hose [A] from the clamp [B] and guides [C].
- Free the rear wheel rotation sensor lead [D] (ABS equipped model) from the clamps [E].



- Remove:
  Muffler Cover (see Muffler Body Removal in the Engine Top End chapter)
  Rear Shock Absorber Lower Nut [A] and Bolt
  Tie-Rod Upper Nut [B] and Bolt

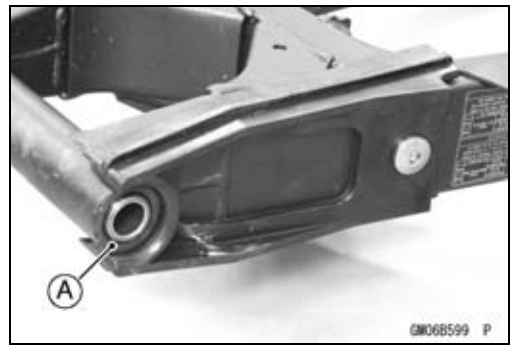


- Remove the cap [A].
- Remove the swingarm pivot shaft nut [B].
- Pull out the pivot shaft and remove the swingarm.



Swingarm Installation

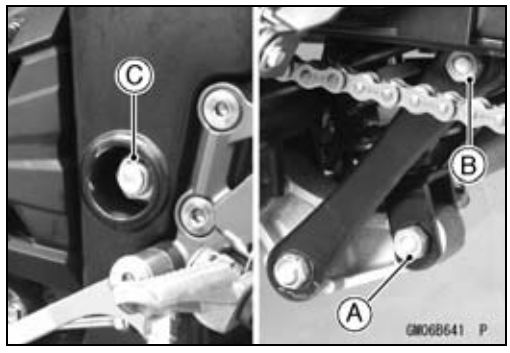
- Installation is the reverse of removal.
- Apply grease to the lips of the oil seals [A].



Swingarm

- Replace:
  Rear Shock Absorber Lower Nut [A]
  Tie-Rod Upper Nut [B]
  O-rings
- Apply grease to the O-ring.
- Tighten:

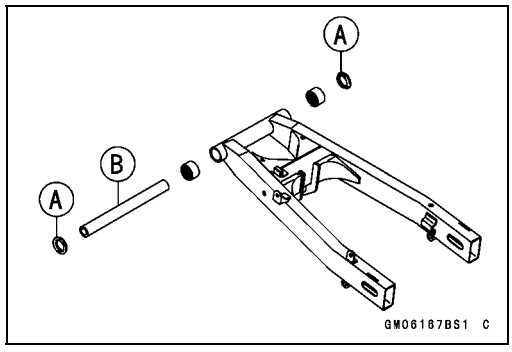
Torque - Swingarm Pivot Shaft Nut [C]: 98 N·m (10.0 kgf·m, 72 ft·lb)
Rear Shock Absorber Lower Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)
Tie-Rod Upper Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)



- Install the removed parts (see appropriate chapters).

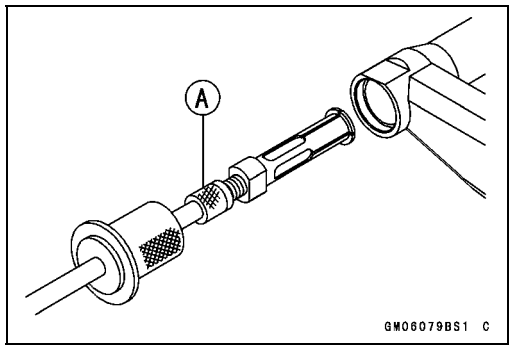
Swingarm Bearing Removal

- Remove:
  Swingarm (see Swingarm Removal)
  Oil Seals [A]
  Sleeve [B]



- Remove the needle bearings.

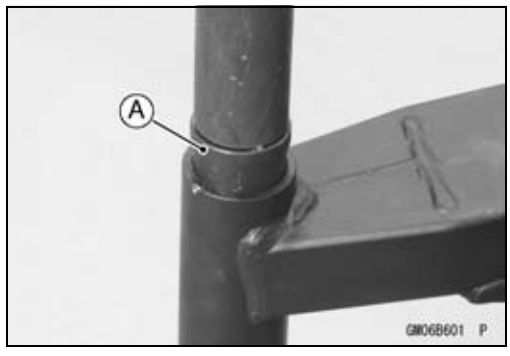
Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



Swingarm Bearing Installation

- Apply plenty of grease to the needle bearings.
- Press the needle bearings so that the manufacturer's marks face out.

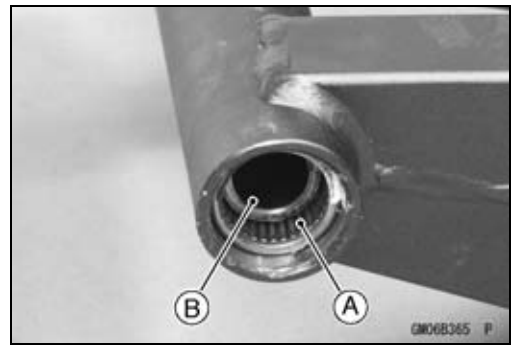
Special Tool - Bearing Driver Set [A]: 57001-1129



Swingarm

Swingarm Bearing, Sleeve Inspection

NOTICE
Do not remove the bearings for inspection. Removal may damage them.



- Inspect the needle bearings [A] installed in the swingarm.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.

★If the needle bearing and sleeve [B] show any signs of abnormal wear, discoloration, or damage, replace them as a set.

Swingarm Bearing Lubrication

- Refer to the Swingarm Pivot Lubrication in the Periodic Maintenance chapter.

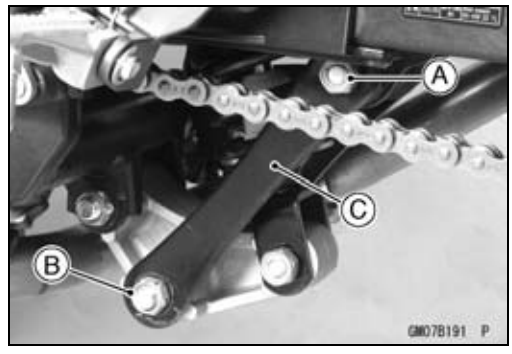
Tie-Rod, Rocker Arm

Tie-Rod Removal

- Squeeze the brake lever slowly and hold it with a band [A].

- Remove:
  Muffler Cover (see Muffler Body Removal in the Engine Top End chapter)
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608



- Remove:
  Tie-Rod Upper Nut and Bolt [A]
  Tie-Rod Lower Nut and Bolt [B]
  Tie-Rod [C] (Both Sides)

Tie-Rod Installation

- Replace the tie-rod nuts and O-rings with new ones.
- Apply grease to the inside of the oil seals and O-rings.
- Tighten:

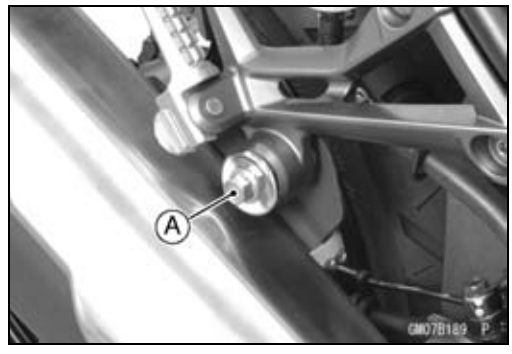
Torque - Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).

Rocker Arm Removal

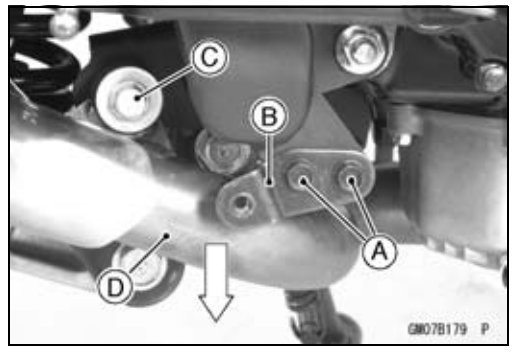
- Squeeze the brake lever slowly and hold it with a band.
- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608



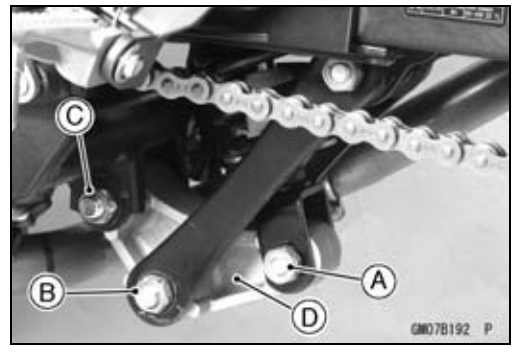
- Remove the muffler mounting bolt [A].

- To remove the rocker arm bolt, remove the followings:
  Bolts [A]
  Stay [B]
- Remove the exhaust pipe mounting bolt [C] and move the exhaust pipe [D] downward.



Tie-Rod, Rocker Arm

- Remove:
  Rear Shock Absorber Lower Nut [A] and Bolt
  Tie-Rod Lower Nut [B] and Bolt
  Rocker Arm Nut [C] and Bolt
  Rocker Arm [D]



Rocker Arm Installation

- Replace:
  Rocker Arm Nut
  Tie-Rod Lower Nut
  Rear Shock Absorber Lower Nut
  O-rings
- Apply grease to the inside of the oil seals and O-rings.
- Tighten:

Torque - Rocker Arm Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)
Tie-Rod Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)
Rear Shock Absorber Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).

Tie-Rod, Rocker Arm Bushing Inspection

- The bushings wear so little that the wear is difficult to measure. Instead, inspect the bushings for abrasion, color change, or other damage.

★If there is any doubt as to the condition of either bushings, replace the bushing with a new one.

Tie-Rod, Rocker Arm Sleeve Inspection

- Visually inspect the sleeves.

★If there is visible damage, replace the sleeve with a new one.

Steering

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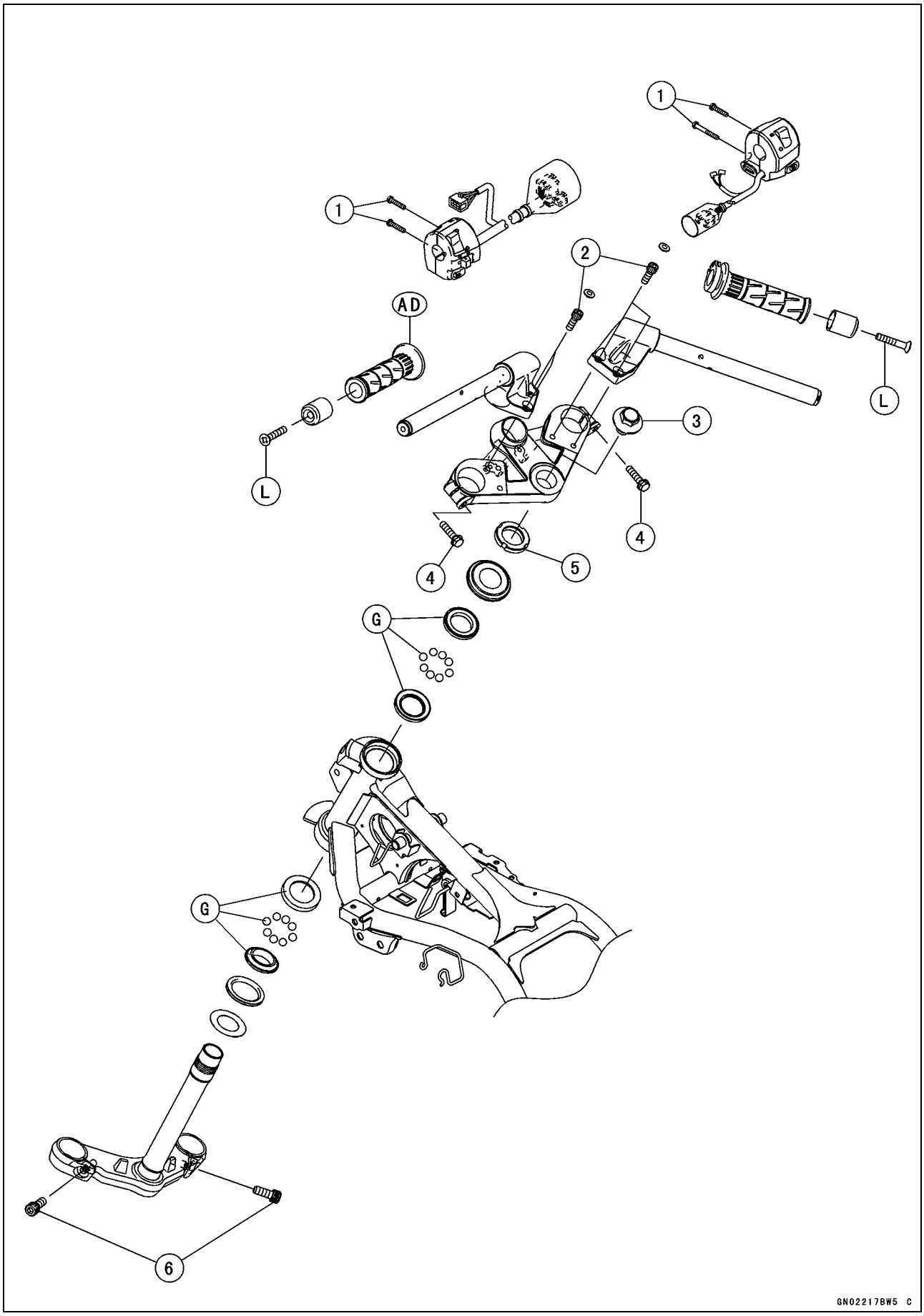
Exploded View



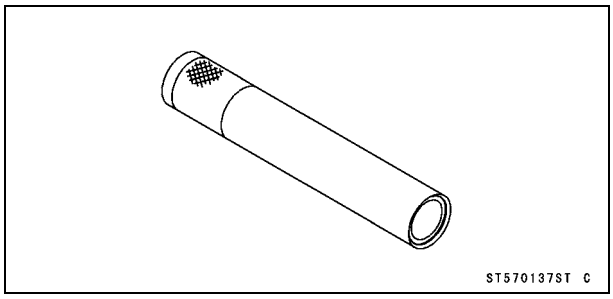
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Switch Housing Screws	3.5	0.36	31 in·lb	
2	Handlebar Mounting Bolts	25	2.5	18	
3	Steering Stem Head Bolt	44	4.5	32	
4	Front Fork Upper Clamp Bolts	20	2.0	15	
5	Steering Stem Nut	20	2.0	15	
6	Front Fork Lower Clamp Bolts	30	3.1	22	

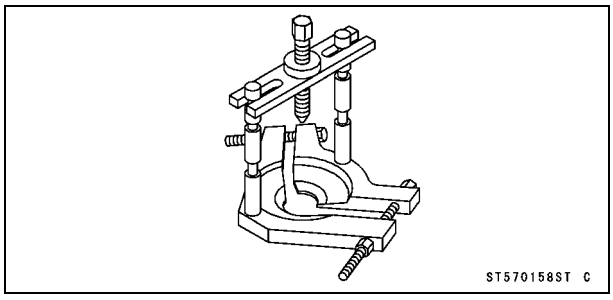
AD: Apply adhesive.
G: Apply grease.
L: Apply a non-permanent locking agent.

Special Tools

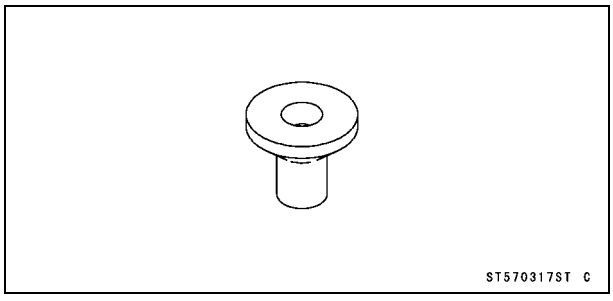
Steering Stem Bearing Driver:
57001-137



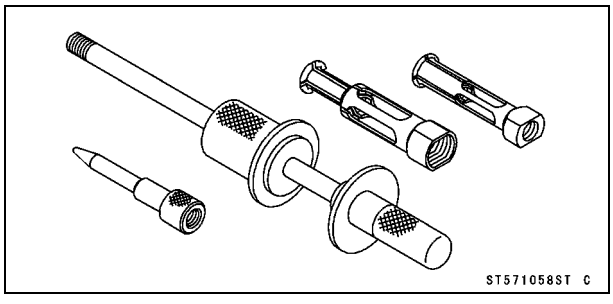
Bearing Puller:
57001-158



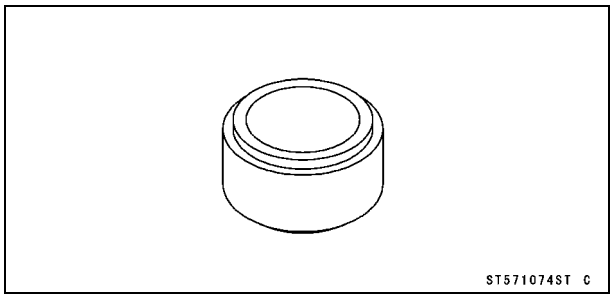
Bearing Puller Adapter:
57001-317



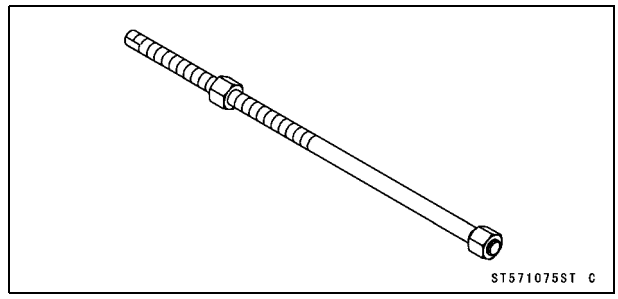
Oil Seal & Bearing Remover:
57001-1058



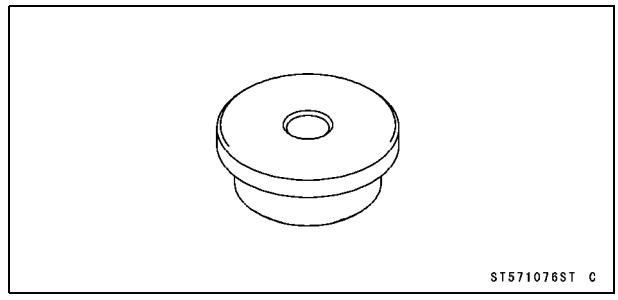
Steering Stem Bearing Driver Adapter, ϕ34.5:
57001-1074



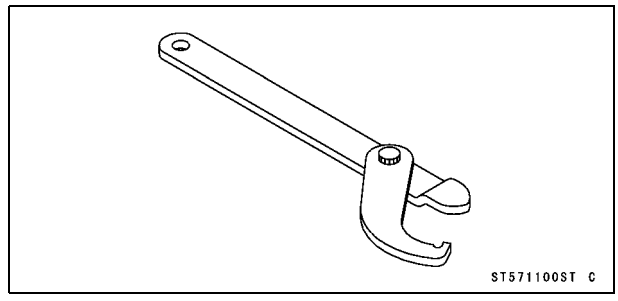
Head Pipe Outer Race Press Shaft:
57001-1075



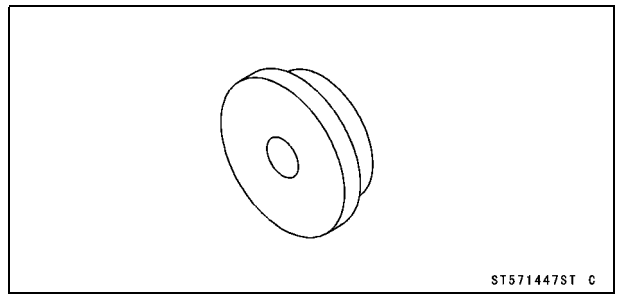
Head Pipe Outer Race Driver, ϕ51.5:
57001-1076



Steering Stem Nut Wrench:
57001-1100



Head Pipe Outer Race Driver, ϕ47:
57001-1447



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

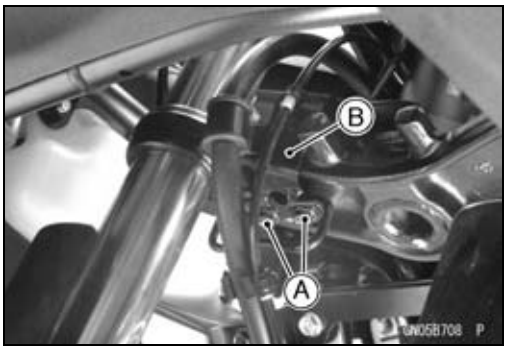
Steering Adjustment

- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

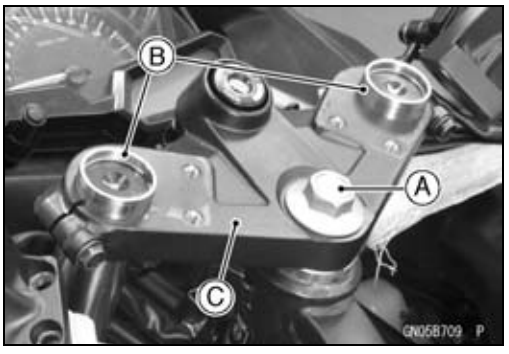
Steering Stem

Stem, Stem Bearing Removal

- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
- Remove the bolts [A] and brake hose clamp [B].



- Remove:
  Handlebars (see Handlebar Removal)
  Steering Stem Head Bolt [A]
  Front Forks [B] (see Front Fork Removal in the Suspension chapter)
  Steering Stem Head [C]



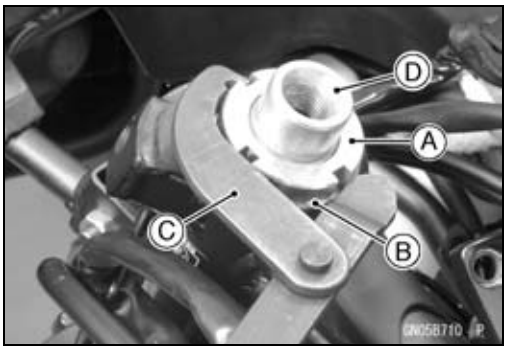
- Pushing up the stem base, and remove the steering stem nut [A] and stem cap [B].

  Special Tool - Steering Stem Nut Wrench [C]: 57001-1100

- Remove:
  Steering Stem [D]
  Upper Ball Bearing Inner Race and Ball Bearings

NOTE

○*Be aware of removing the steering stem so that the stem bearing steel balls are not lost.*

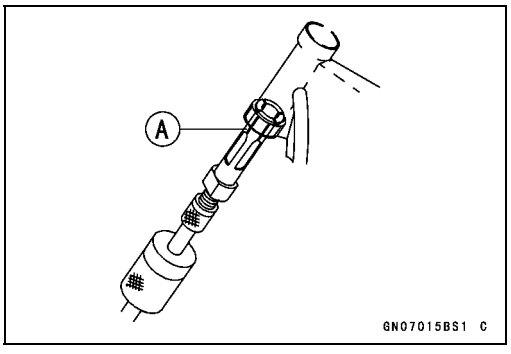


- Remove the upper and lower outer races using the remover [A].

  Special Tool - Oil Seal & Bearing Remover: 57001-1058

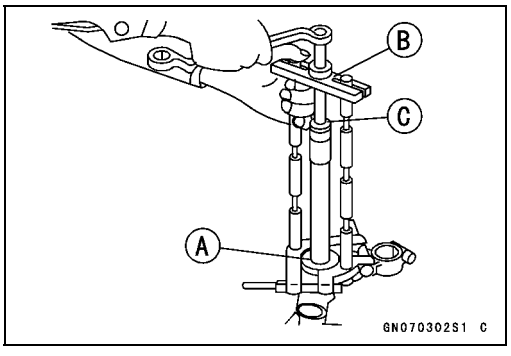
NOTE

○*If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*



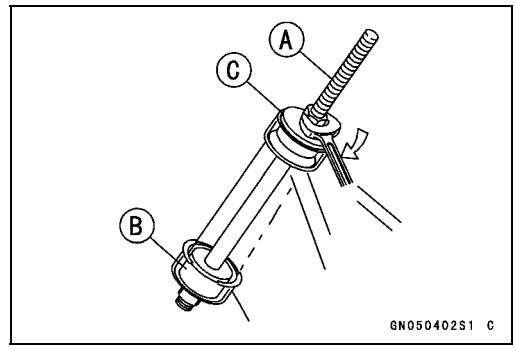
- Remove the lower ball bearing inner race (with its oil seal) [A] which is pressed onto the steering stem using the bearing puller [B] and adapter [C].

  Special Tools - Bearing Puller: 57001-158
  Bearing Puller Adapter: 57001-317



Steering Stem

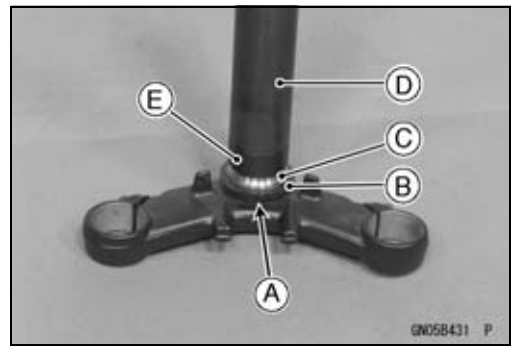
Stem, Stem Bearing Installation



- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

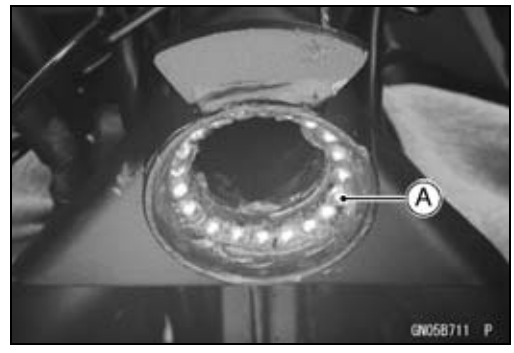
Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Head Pipe Outer Race Driver, ϕ51.5 [B]: 57001-1076
Head Pipe Outer Race Driver, ϕ47 [C]: 57001-1447

- Apply grease to the outer races.

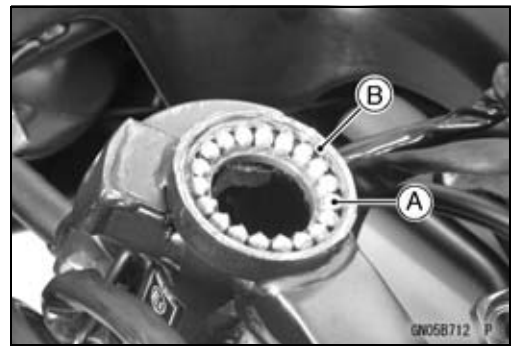


- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the washer [A] and oil seal [B] on the steering stem, and drive the ball bearing inner race [C] applied grease onto the stem.

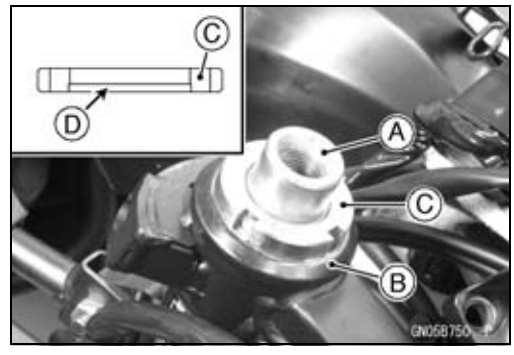
Special Tools - Steering Stem Bearing Driver [D]: 57001-137
Steering Stem Bearing Driver Adapter, ϕ34.5 [E]: 57001-1074



- Apply grease to the lower ball bearings (20) [A] and outer race and install the ball bearings onto the outer race.



- Apply grease to the upper ball bearings (19) [A] and outer race [B], and install the ball bearings onto the outer race.



- Install the steering stem [A] carefully through the head pipe so that the steel balls on the head pipe does not fall.
- Apply grease to the upper ball bearing inner race and install it.
- Install the stem cap [B] and steering stem nut [C], and tighten it by hand.

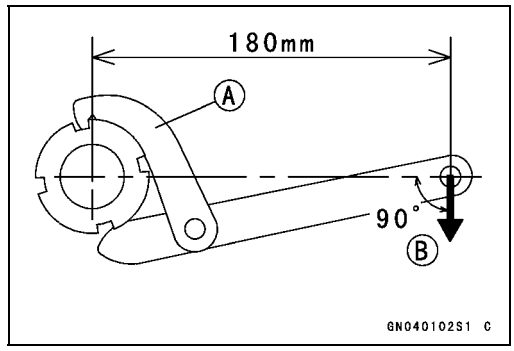
○Install the steering stem nut with stepped side [D] facing down.

Steering Stem

● Settle the bearings in place as follows.

○Tighten the steering stem nut with **35 N·m (3.6 kgf·m, 26 ft·lb)** of torque first (Pull the steering stem nut wrench [A] at the hole by 194 N (19.8 kgf) force [B] in the direction shown), and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using the steering stem nut wrench.

○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.



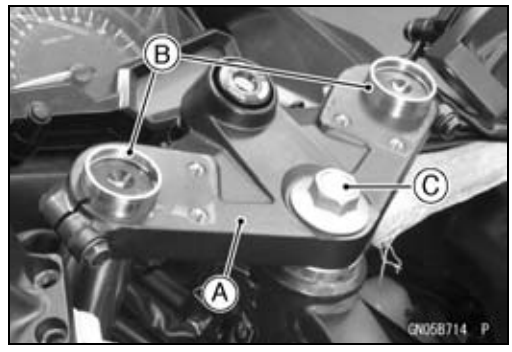
Special Tool - Steering Stem Nut Wrench: 57001-1100

Torque - Steering Stem Nut: 20 N·m (2.0 kgf·m, 15 ft·lb)

● Install the stem head [A].

● Install the front forks [B] temporarily (see Front Fork Installation in the Suspension chapter).

● Tighten the stem head bolt [C] temporarily.



NOTE

○*Tighten the front fork upper clamp bolts first, next the stem head bolt, last the front fork lower clamp bolts.*

Torque - Front Fork Upper Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)
Front Fork Lower Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)

⚠ WARNING

If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

● Run the leads, wire harness and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

● Install the removed parts (see appropriate chapters).

Steering Stem Bearing Lubrication

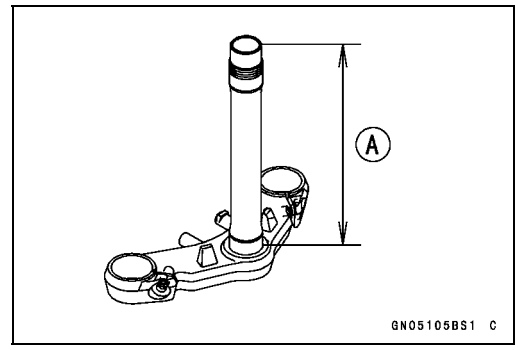
● Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem

Steering Stem Warp Inspection

- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness [A].

★If the steering stem is bent, replace it with a new one.



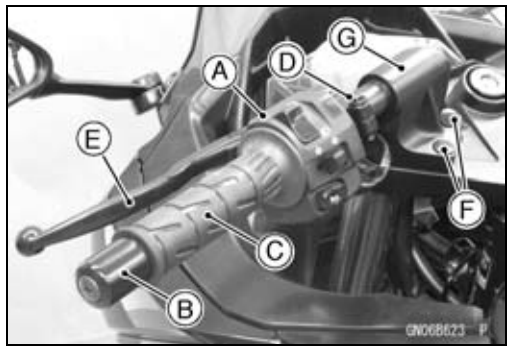
Oil Seal Deterioration, Damage Inspection

- Inspect the oil seal for any sign of deterioration or damage.

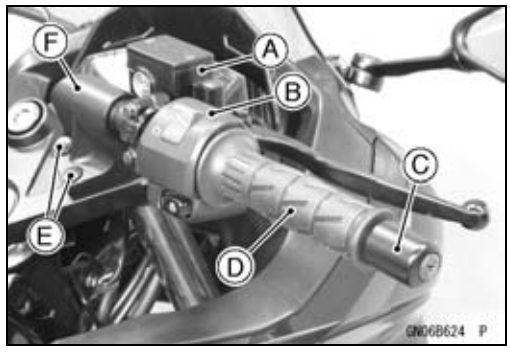
★If the oil seal is deterioration or damage, replace it with a new one.

Handlebar

Handlebar Removal



- Remove:
  Left Switch Housing [A]
  Handlebar Weight [B]
  Left Handlebar Grip [C]
  Clutch Lever Clamp Bolt [D]
  Clutch Lever Assembly [E]
  Caps [F] and Bolts
  Left Handlebar [G]

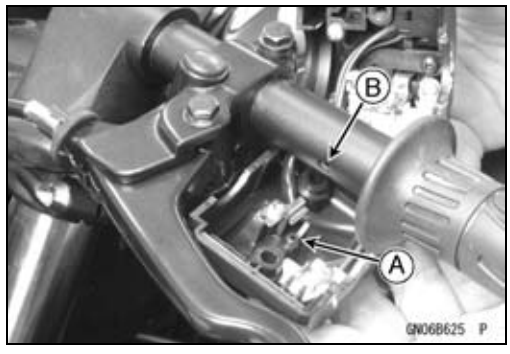


- Remove:
  Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brakes chapter)
  Right Switch Housing [B]
  Handlebar Weight [C]
  Throttle Grip [D]
  Caps [E] and Bolts
  Right Handlebar [F]

Handlebar Installation

- Tighten:

Torque - Handlebar Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

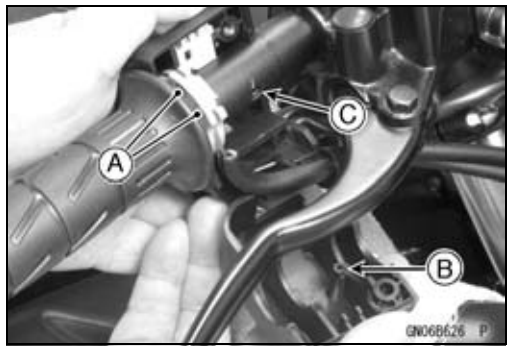


- Install the clutch lever (see Clutch Lever Installation in the Clutch chapter).
- Apply adhesive cement to the inside of the left handlebar grip, and install it.
- Apply a non-permanent locking agent to the left handlebar weight screw, and tighten it.
- Install the left switch housing.

○Fit the projection [A] into a hole [B] in the handlebar.

- Tighten:

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



- Install:
  Throttle Grip
  Throttle Cable Tips [A]
  Right Switch Housing

○Fit the projection [B] into a hole [C] in the handlebar.

- Tighten:

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

- Apply a non-permanent locking agent to the right handlebar weight screw, and tighten it.
- Install the front brake master cylinder (see Front Master Cylinder Installation in the Brakes chapter).
- Push the caps into the handlebar mounting bolts.

Frame

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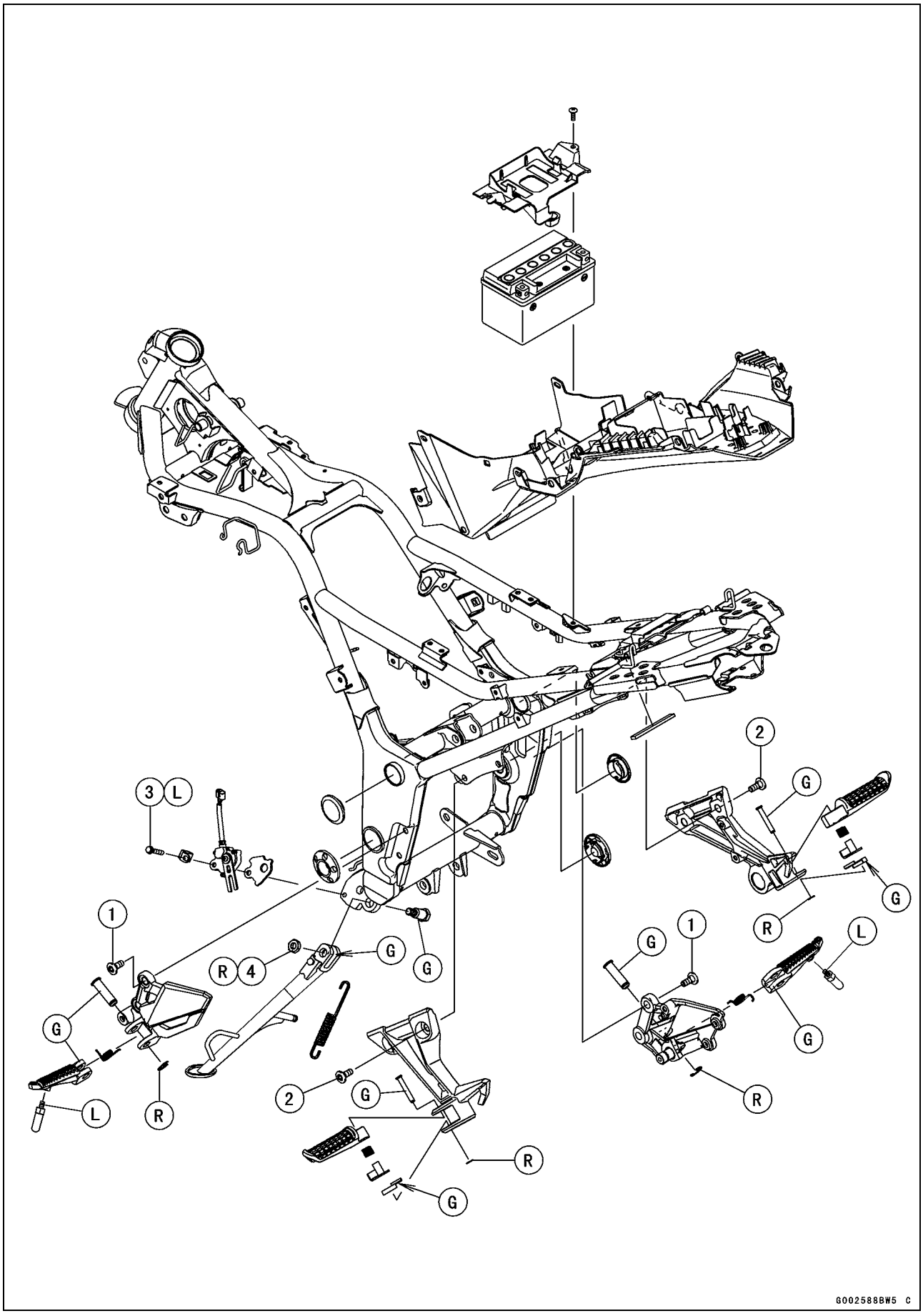
Exploded View

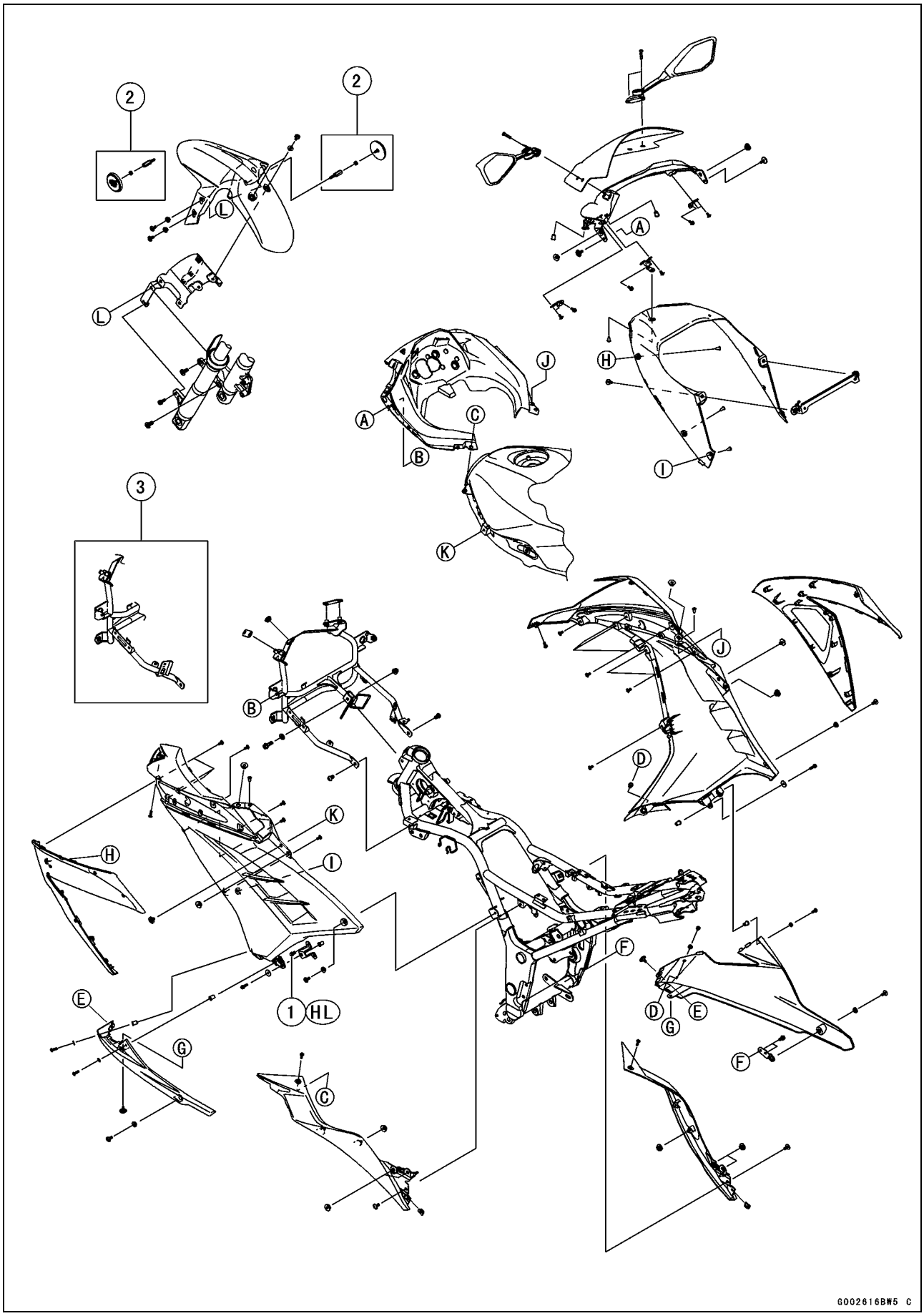


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Footpeg Bracket Bolts	25	2.5	18	
2	Rear Footpeg Bracket Bolts	25	2.5	18	
3	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
4	Sidestand Nut	39	4.0	29	R

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View



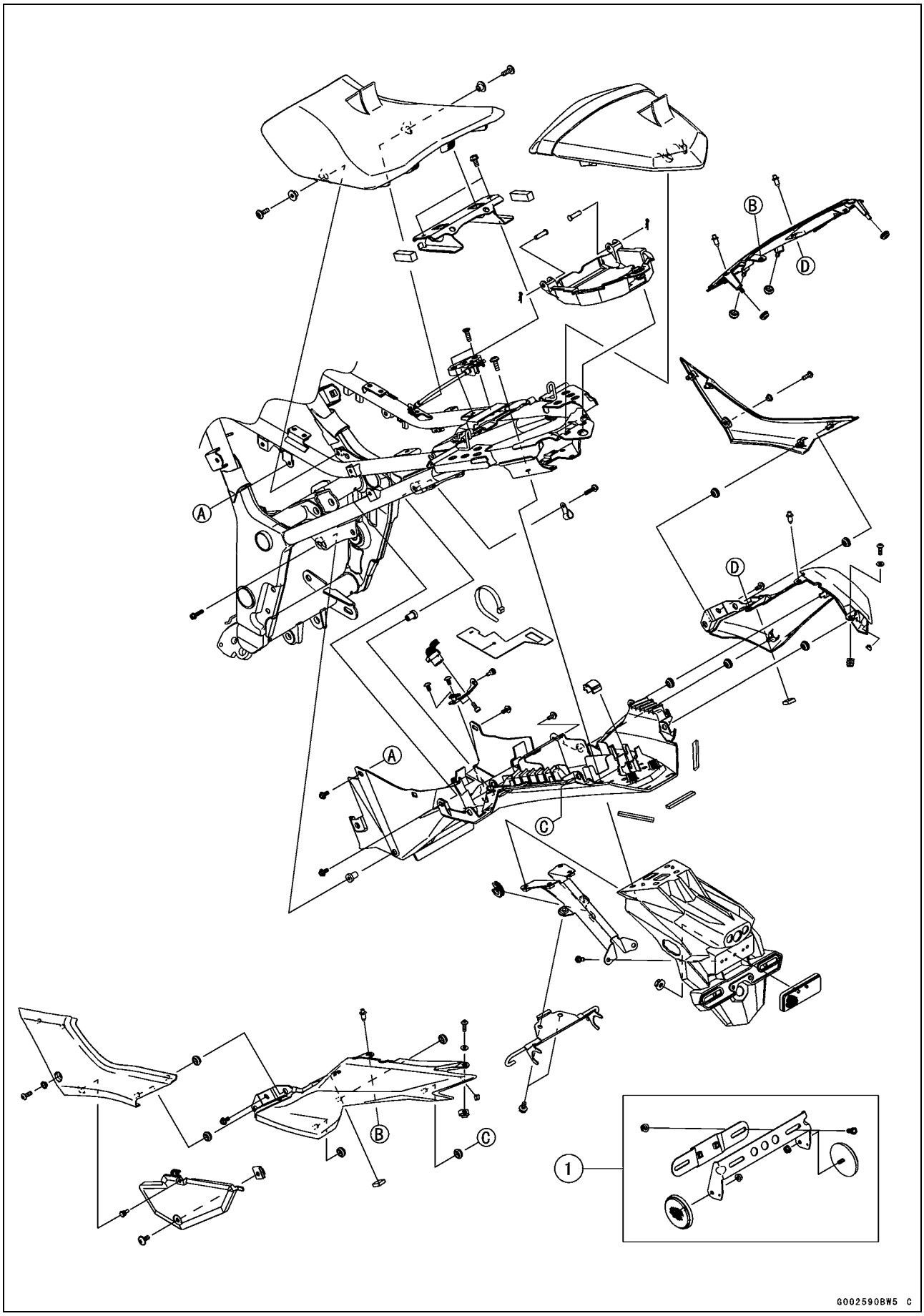
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Left Middle Fairing Bracket Bolts	9.8	1.0	87 in·lb	HL

2. US, CAL, CA, AU and CO Models
3. CAL Model

HL: Apply a non-permanent locking agent (High Strength).

Exploded View



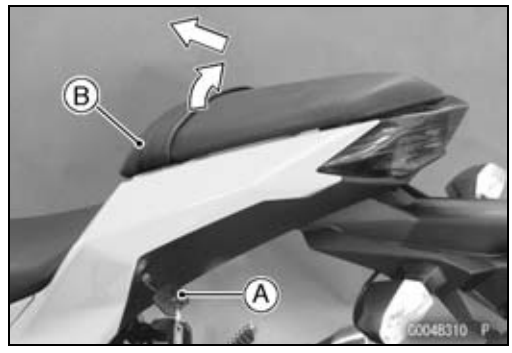
Exploded View

1. US, CAL, CA, AU and CO Models

Seats

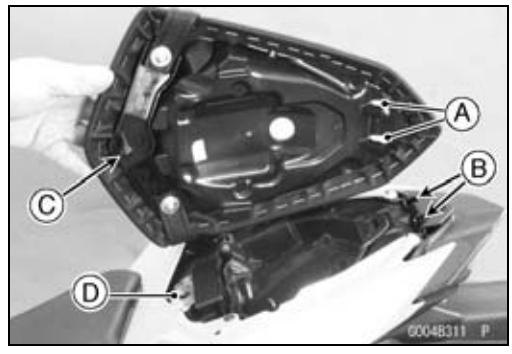
Rear Seat Removal

- Insert the ignition key [A] into the seat lock, turning the key clockwise, pull up the front of seat [B], and remove the rear seat by pushing it to the front.



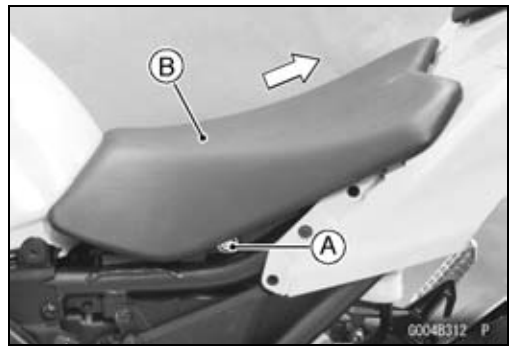
Rear Seat Installation

- Insert the rear seat tabs [A] to the slots [B] on the frame.
- Insert the seat lock projection [C] into the latch hole [D].
- Push down the front part of the seat until the lock clicks.



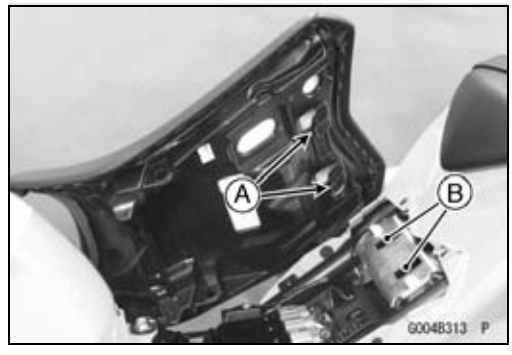
Front Seat Removal

- Remove:
  Side Covers (see Side Cover Removal)
  Bolt [A] and collar (Both Sides)
- Pull the front seat [B] backward.



Front Seat Installation

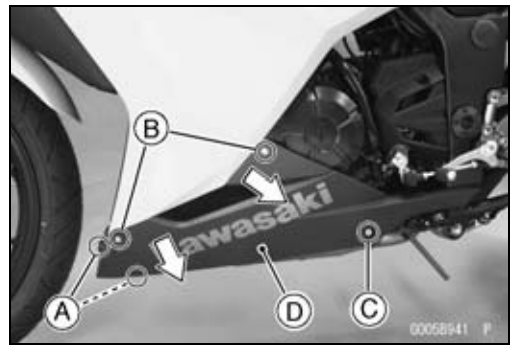
- Insert the front seat tabs [A] into the slots [B] on the bracket.
- Install the collars and tighten the bolts.
- Install the side covers (see Side Cover Installation).



Fairings

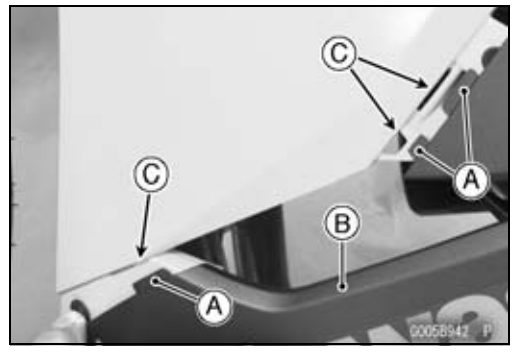
Lower Fairing Removal

- Remove:
  Quick Rivets [A]
  Bolts and Nylon Washers [B]
  Bolt and Nylon Washer [C]
  Lower Fairing [D]



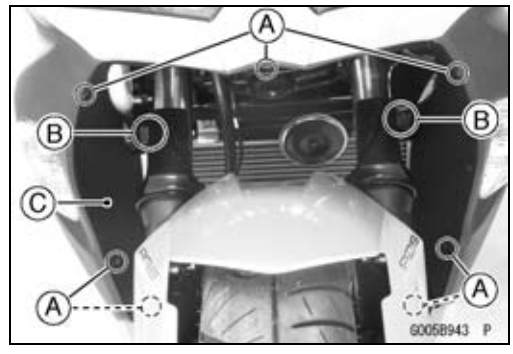
Lower Fairing Installation

- Installation is the reverse of removal.
- Insert the tabs [A] on the lower fairing [B] into the slots [C] on the side fairing.



Inner Fairing Removal

- Remove:
  Quick Rivets [A]
  Bolts [B]
  Inner Fairing [C]

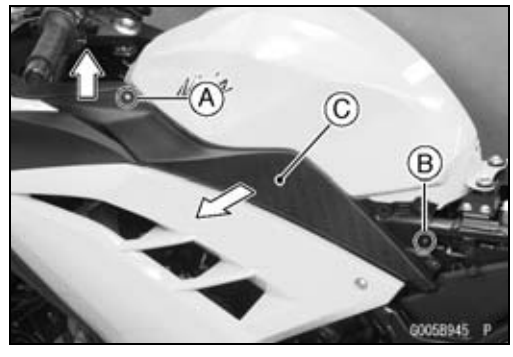


Inner Fairing Installation

- Installation is the reverse of removal.
- Insert the tabs [A] on the inner fairing into the grooves behind the middle fairing.

Tank Side Cover Removal

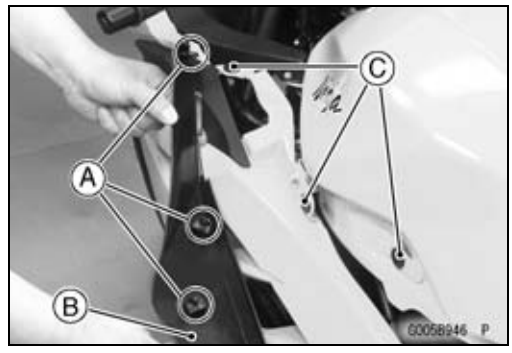
- Remove:
  Side Cover (see Side Cover Removal)
  Bolt [A]
  Screw [B]
- Pull the rear of the tank side cover [C] outward then pull the front of the tank side cover upward.



Fairings

Tank Side Cover Installation

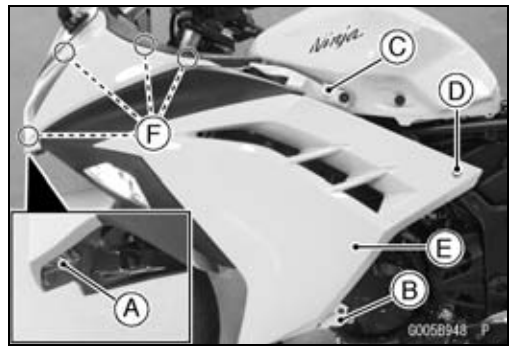
- Installation is the reverse of removal.
- Insert the projections [A] on the tank side cover [B] into the grommets [C] on the middle fairing and fuel tank.



Middle Fairing Removal

- Remove:
  Lower Fairing (see Lower Fairing Removal)
  Inner Fairing (see Inner Fairing Removal)
  Tank Side Cover (Tank Side Cover Removal)
- Remove the quick rivet [A].

- Remove:
  5 mm Bolt [A]
  5 mm Bolt [B] and Washer
  6 mm Bolt [C] and Washer
  6 mm Bolt [D] and Collar
- Pull the middle fairing [E] outward to clear the tabs [F] from the slots.
- Disconnect the front turn signal light lead connector and remove the middle fairing.

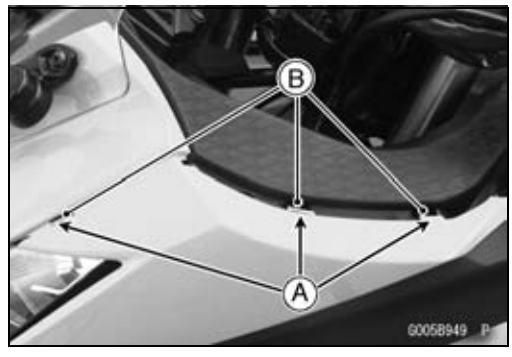


Middle Fairing Installation

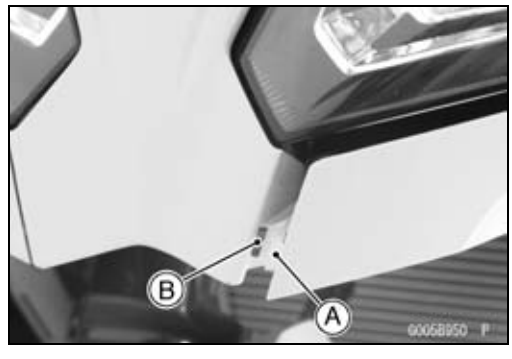
- Connect the front turn signal connector.

○Make sure that the reserve tank overflow hose is routed properly.

- Insert the tab [A] on the middle fairing into the slot [B] on the upper fairing and instrument cover.

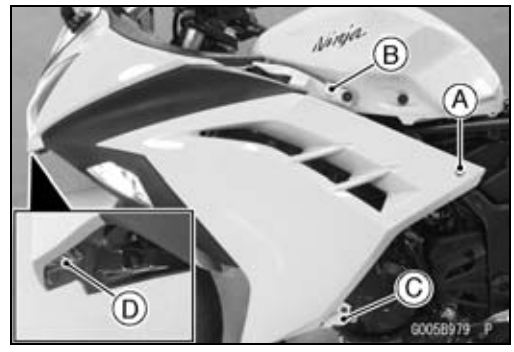


- Insert the tab [A] on the middle fairing into the slot [B] on the upper fairing.



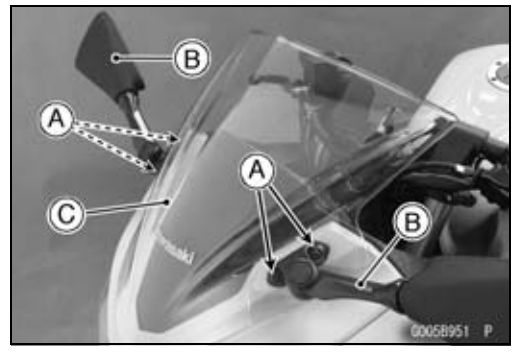
Fairings

- Tighten the bolts in the following order.
  6 mm Bolt [A] and Collar
  6 mm Bolt [B] and Washer
  5 mm Bolt [C] and Washer
  5 mm Bolt [D]



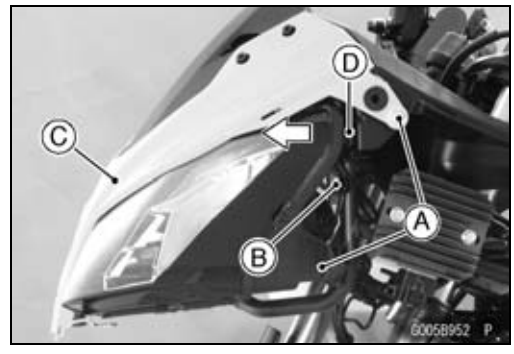
Windshield Removal/Installation

- Remove:
  Bolts [A]
  Rear View Mirrors [B]
  Windshield [C]
- Installation is the reverse of removal.

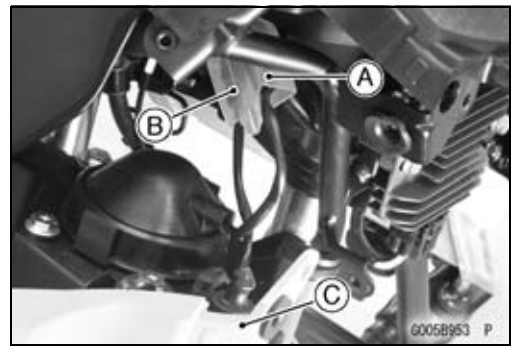


Upper Fairing Removal

- Remove:
  Middle Fairing (see Middle Fairing Removal)
  Windshield (see Windshield Removal/Installation)
  Bolts [A] (Both Sides)
  Band [B] (Both Sides)
- Move the upper fairing [C] forward to remove it from the grommet [D].



- Disconnect the headlight lead connector [A] and city light lead connector [B] from the headlight (both sides).
- Remove the upper fairing [C] from the upper fairing bracket.
- Remove the headlight from the upper fairing (see Headlight Removal/Installation in the Electrical System chapter).

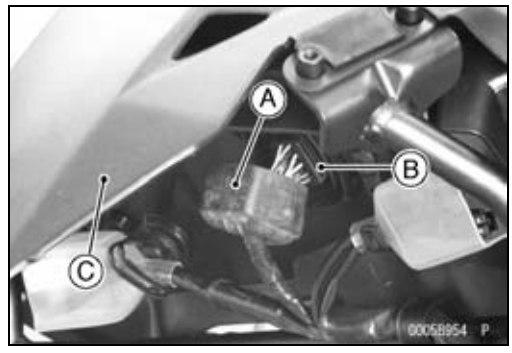


Upper Fairing Installation

- Assembly is the reverse of removal.
- Install the removed parts (see appropriate chapters).
- Run the cable, leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

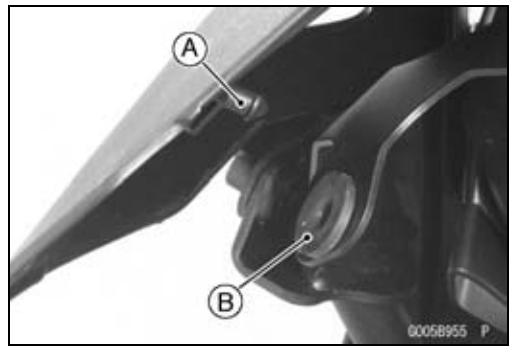
Fairings

Instrument Cover Removal



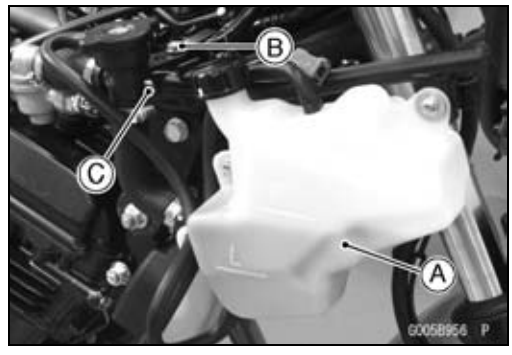
- Remove the upper fairing (see Upper Fairing Removal).
- Slide the connector cover [A] and disconnect the meter connector [B] from the meter unit.
- Remove the instrument cover [C] forward.
- Remove the meter unit (see Meter Unit Removal/Installation in the Electrical System chapter).

Instrument Cover Installation

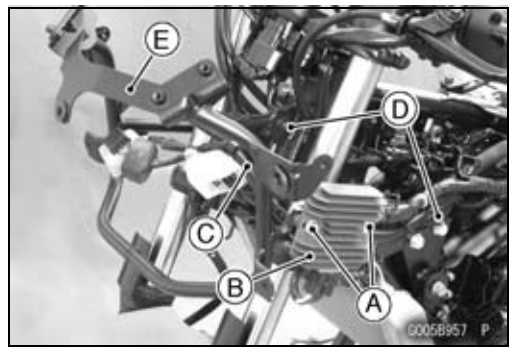


- Installation is the reverse of removal.
- Insert the projection [A] on the instrument cover into the grommet [B] on the bracket.
- Install the removed parts (see appropriate chapters).

Upper Fairing Bracket Removal



- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Coolant Reserve Tank [A] (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Bolt [B]
  Bracket Mounting Bolt [C]



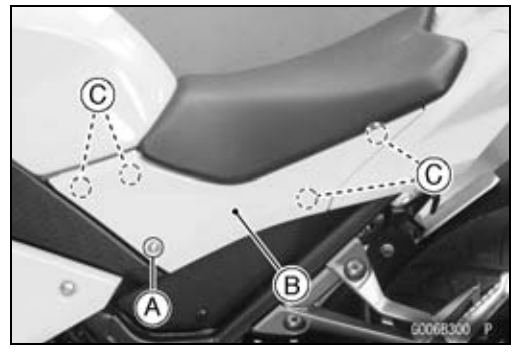
- Remove the bolts [A] and regulator/rectifier [B].
- Clear the main harness [C] from the clamps.
- Remove the bracket mounting bolts [D] and upper fairing bracket [E].

Upper Fairing Bracket Installation

- Installation is the reverse of removal.
- Install the removed parts (see appropriate chapters).
- Run the cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Side Cover

Side Cover Removal

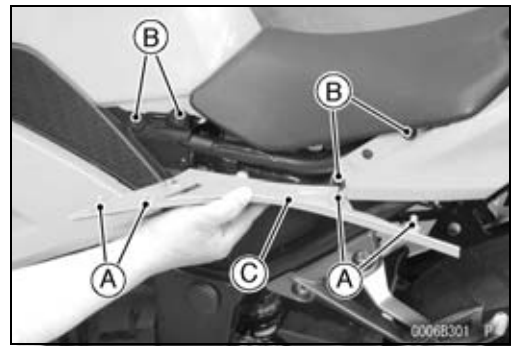


- Remove the bolt and collar [A].
- Pull the side cover [B] outward straight to detach the projections [C] from the grommets.

NOTE

○*Be careful not to tilt the side cover when pulling it out to prevent the projections from the breaking.*

Side Cover Installation

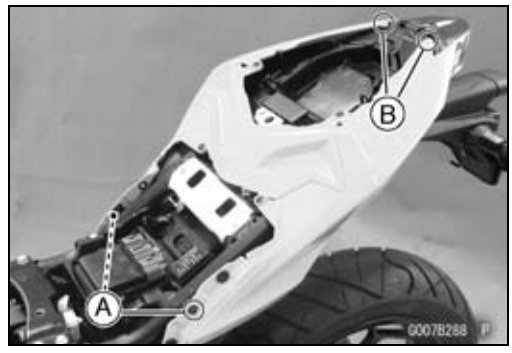


- Insert the projections [A] into the grommets [B] and push the side cover [C].
- Install the collar and bolts.

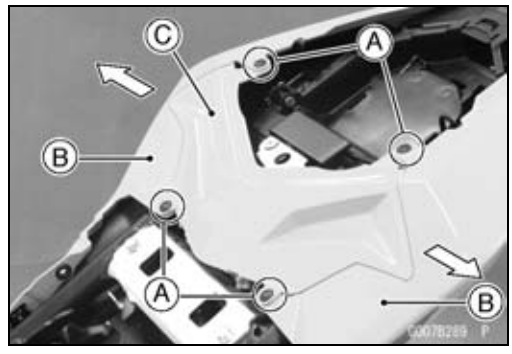
○Make sure that the grommets are not come off when inserting the projections.

Seat Covers

Seat Cover Removal

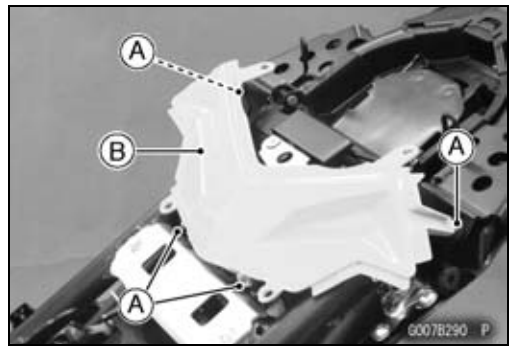


- Remove:
  Side Covers (see Side Cover Removal)
  Seats (see Rear/Front Seat Removal)
  Bolts [A]
  Bolts [B]

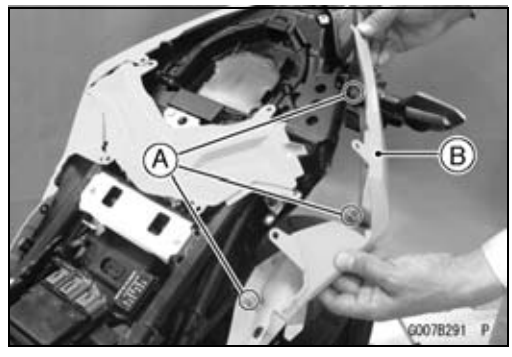


- Remove the quick rivets [A].
- Pull the seat covers [B] outward.
- Remove the center cover [C].

Seat Cover Installation



- Installation is the reverse of removal.
- Insert the projections [A] on the center cover [B] into the grommet.

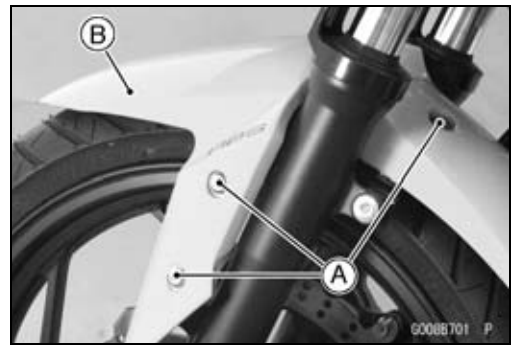


- Insert the projections [A] on the seat covers [B] into the grommets on the frame.

○Make sure that the grommets are not comes off when inserting the projections.

Fenders

Front Fender Removal



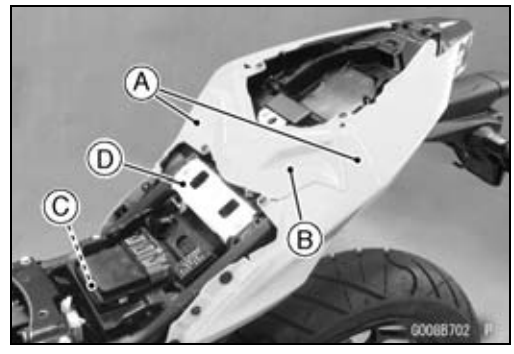
- Remove:
  Bolts [A] with Collars (Both Sides)
  Front Fender [B]

○For US, CAL, CA, AU and CO models, remove the reflector before removing the bolts.

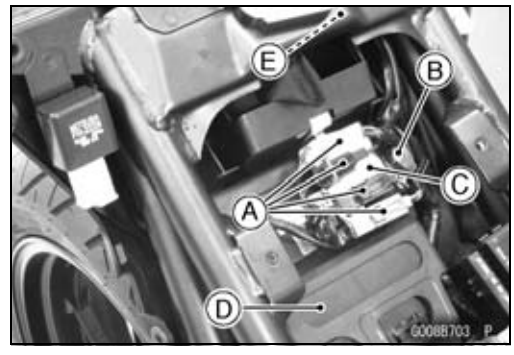
Front Fender Installation

- Installation is the reverse of removal.

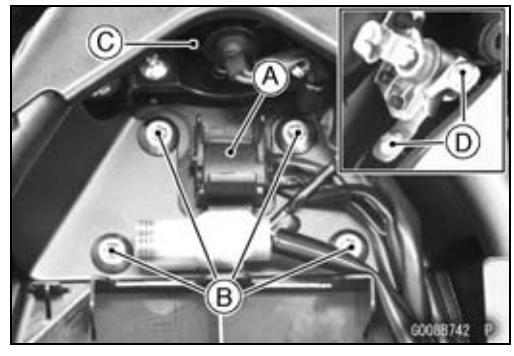
Flap and Rear Fender Removal



- Remove:
  Seat Covers [A] and Center Cover [B] (see Seat Cover Removal)
  Battery [C] (see Battery Removal in the Electrical System chapter)
  Seat Bracket [D]



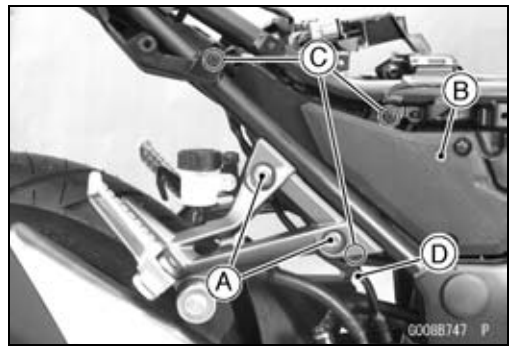
- Disconnect each connector [A].
- Remove the screw [B] and move the holder [C] aside.
- Pull out the ECU [D] from the rear fender.
- Free each lead from the clamp [E].



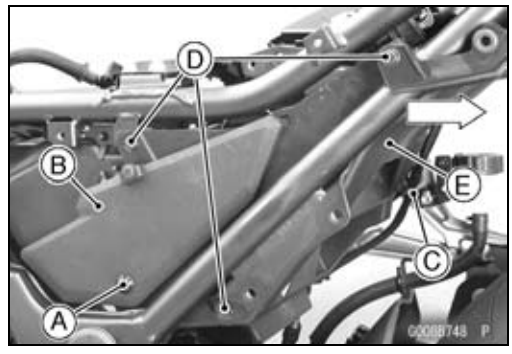
- Remove the lead cover [A].
- Remove the bolts [B] and flap assembly from the rear fender.
- Remove:
  Tail/Brake Light Socket [C] (see Tail/Brake Light Bulb Replacement in the Electrical System chapter)
  Seat Lock Screws [D]

Fenders

- Remove:
  Rear Footpeg Bracket Bolts [A] (Both Sides)
  Screw and Air Cleaner Housing Cap [B]
  Rear Fender Mounting Bolts [C]
  Clamp [D] (Right Side only)

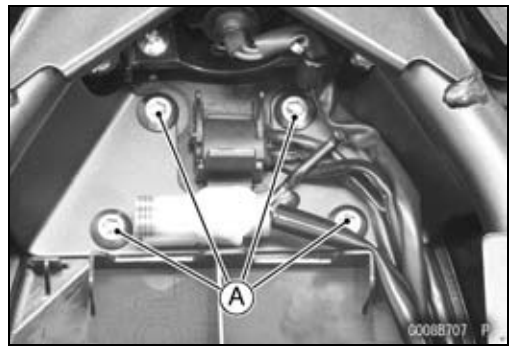


- Remove:
  Screw [A]
  Cover [B]
  Clamp [C]
  Rear Fender Mounting Bolts [D]
- Remove the rear fender [E] rearward.

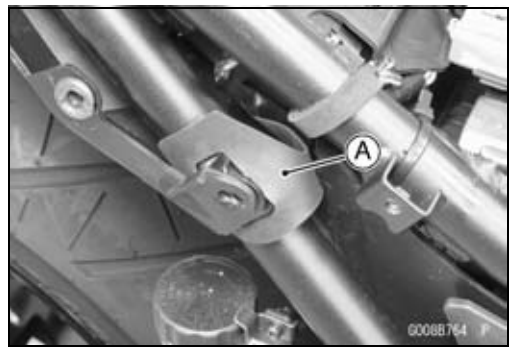


Flap and Rear Fender Installation

- Fit the rear fender assembly to the frame.
- Run the cable, leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the bolts [A] temporarily to hold the rear fender.

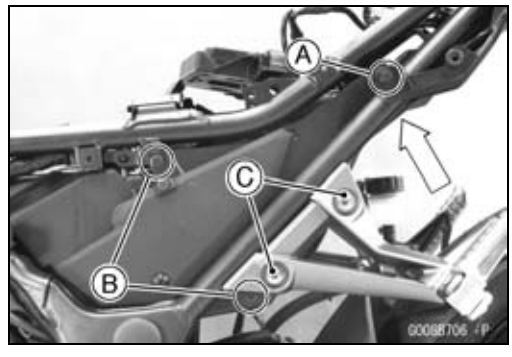


- Install the rubber damper [A] to the frame.



- Install the rear fender side mounting bolts temporarily.
- Tighten the middle bolt [A] (both side) first while pushing up the rear fender.
- Tighten the front mounting bolts [B] (both sides) and rear mounting bolts.
- Install the removed parts (see appropriate chapters).

Torque - Rear Footpeg Bracket Bolts [C]: 25 N·m (2.5 kgf·m, 18 ft·lb)



Frame

Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.

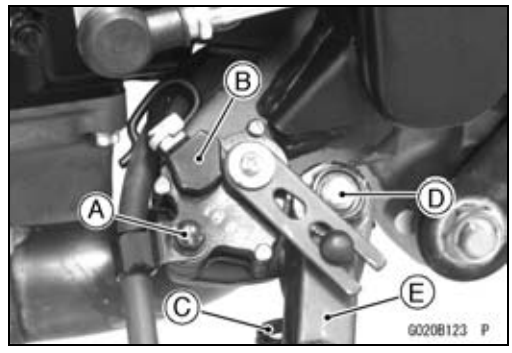
★If there is any damage to the frame, replace it.

⚠ WARNING

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

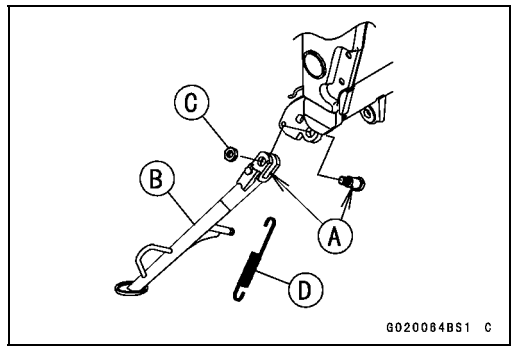
Sidestand

Sidestand Removal



- Raise the rear wheel off the ground with the stand.
- Remove the lower fairing (see Lower Fairing Removal).
- Remove:
  Sidestand Switch Bolt [A]
  Sidestand Switch [B]
  Spring [C]
  Sidestand Nut and Bolt [D]
  Sidestand [E]

Sidestand Installation



- Apply grease to the sliding area [A] of the sidestand [B].
- Replace the sidestand nut [C] with a new one.
- Tighten the sidestand nut.

  Torque - Sidestand Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)

- Hook the spring [D] in the direction as shown.
- Install the sidestand switch.
- Apply a non-permanent locking agent to the threads of the switch bolt, and tighten it.

  Torque - Sidestand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

○Run the lead and hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.

- Install the lower fairing (see Lower Fairing Installation).

Electrical System

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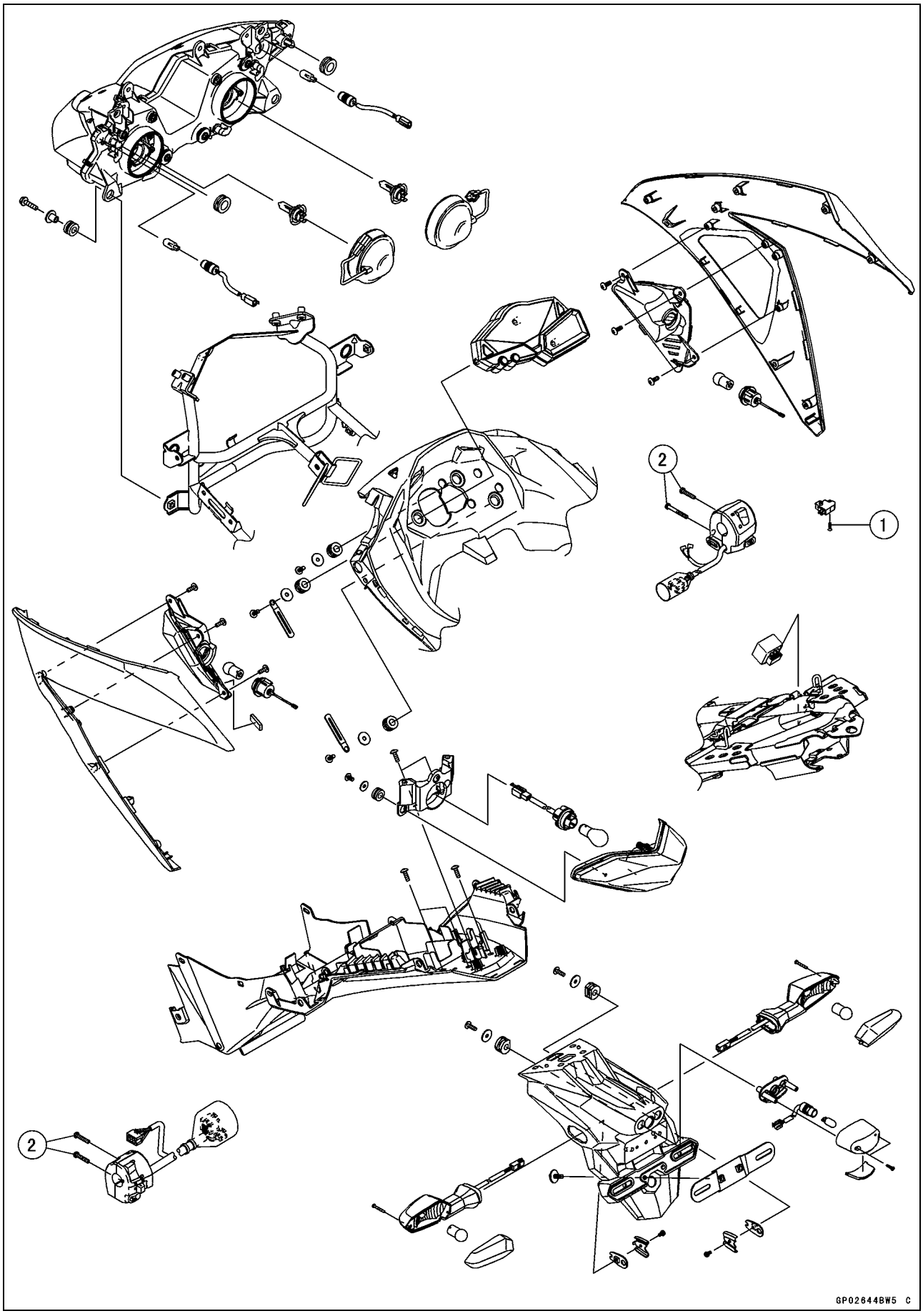
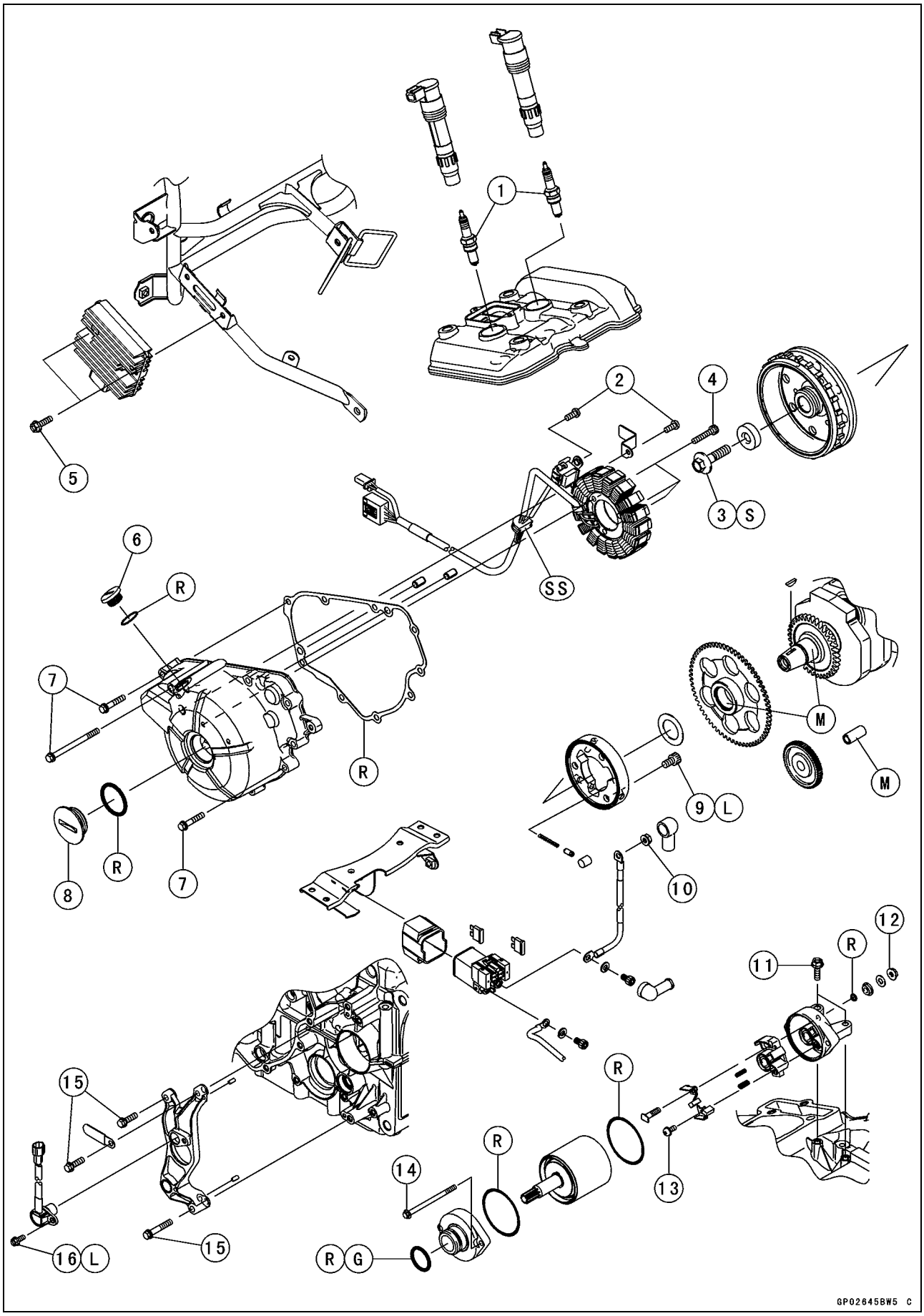
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
2	Switch Housing Screws	3.5	0.36	31 in·lb	

Exploded View

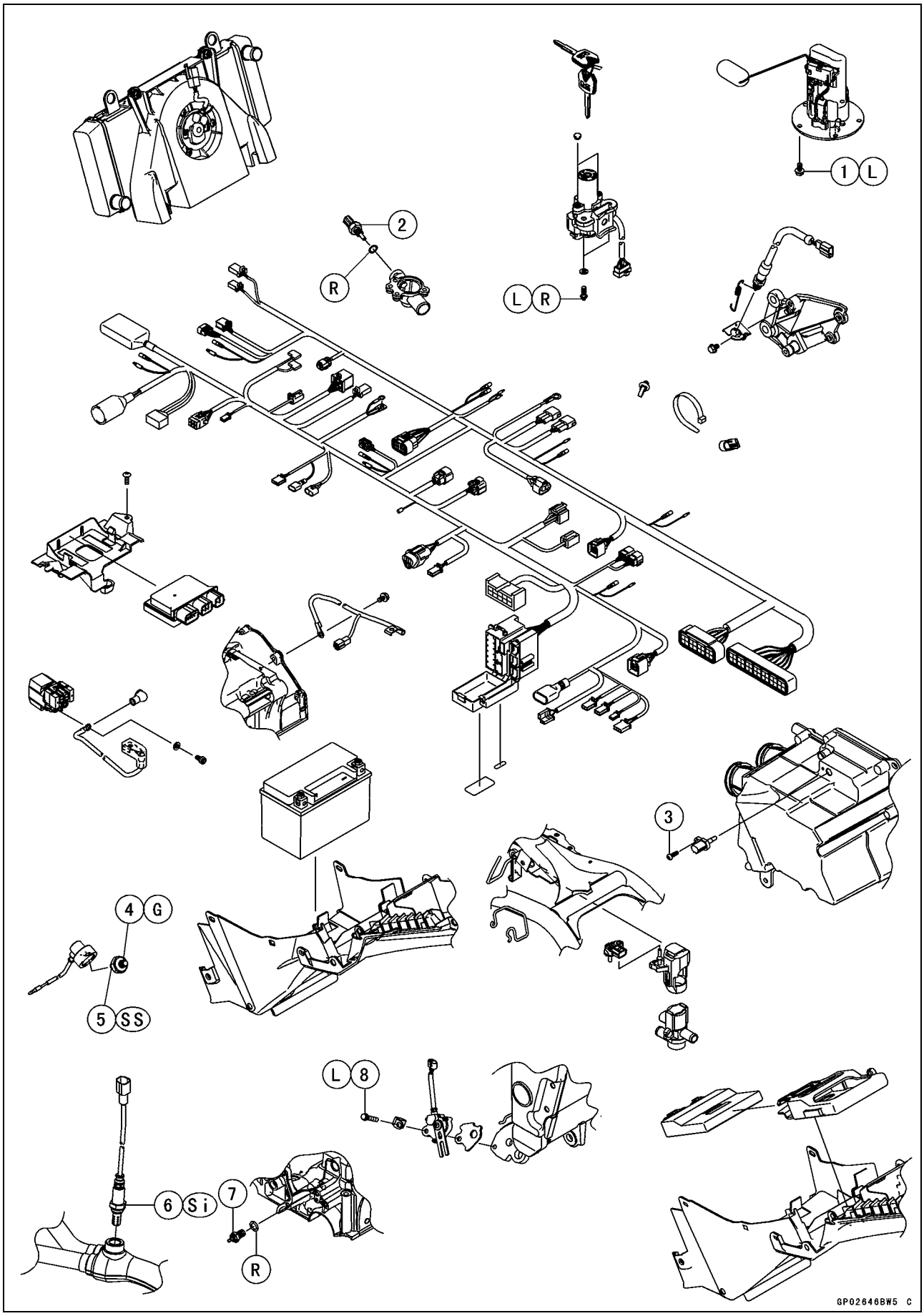


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spark Plugs	13	1.3	115 in·lb	
2	Crankshaft Sensor Screws	5.2	0.53	46 in·lb	
3	Alternator Rotor Bolt	107.8	10.99	79.51	S
4	Stator Coil Bolts	12	1.2	106 in·lb	
5	Regulator/rectifier Mounting Bolts	9.8	1.0	87 in·lb	
6	Alternator Cover Plug	–	–	–	Hand -Tighten
7	Alternator Cover Bolts	9.8	1.0	87 in·lb	
8	Alternator Rotor Bolt Cap	–	–	–	Hand -Tighten
9	Starter Motor Clutch Bolts	34.3	3.50	25.3	L
10	Starter Motor Cable Terminal Nut	9.8	1.0	87 in·lb	
11	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
12	Starter Motor Terminal Locknut	11	1.1	97 in·lb	
13	Starter Motor Brush Holder Screw	3.8	0.39	34 in·lb	
14	Starter Motor Through Bolts	5.0	0.51	44 in·lb	
15	Speed Sensor Bracket Bolts	9.8	1.0	87 in·lb	
16	Speed Sensor Bolt	7.8	0.80	69 in·lb	L

G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Pump Bolts	9.8	1.0	87 in·lb	L
2	Water Temperature Sensor	12	1.2	106 in·lb	
3	Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
4	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
5	Oil Pressure Switch	15	1.5	11	SS
6	Oxygen Sensor	44.1	4.50	32.5	Si
7	Neutral Switch	15	1.5	11	
8	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L

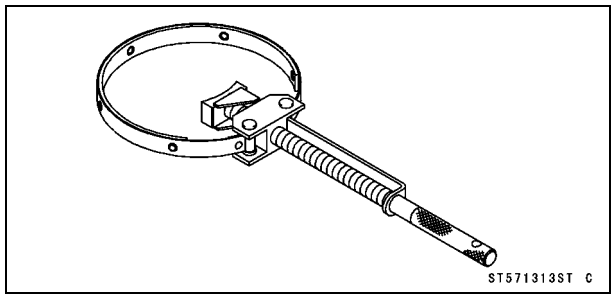
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease (ex. PBC grease).
SS: Apply silicone sealant.

Specifications

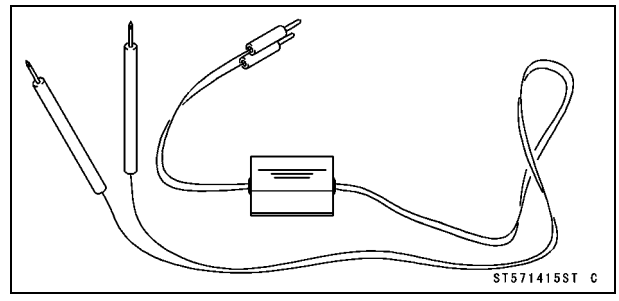
Item	Standard
Battery	
Type	Sealed Battery
Model Name	FTX9-BS
Capacity	12 V 8 Ah
Voltage	12.6 V or more
Gross Weight	3.0 kg (6.6 lb)
Electrolyte Volume	0.41 L (25 cu in.)
Charging System	
Type	Three-phase AC
Alternator Output Voltage	35 V or more at 4 000 r/min (rpm)
Stator Coil Resistance	0.05 ~ 0.6 Ω at 20°C (68°F)
Charging Voltage (Regulator/Rectifier Output Voltage)	14.0 ~ 14.6 V
Ignition System	
Crankshaft Sensor Resistance	180 ~ 280 Ω
Crankshaft Sensor Peak Voltage	4.5 V or more
Stick Coil:	
Primary Winding Resistance	1.1 ~ 1.5 Ω
Secondary Winding Resistance	6.4 ~ 9.6 kΩ
Primary Peak Voltage	90 V or more
Spark Plug:	
Type	NGK CR8E
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Electric Starter System	
Starter Motor:	
Brush Length	12 mm (0.47 in.) (Service Limit: 6.5 mm (0.26 in.))
Air Switching Valve	
Resistance	20 ~ 24 Ω at 20°C (68°F)
Switches and Sensors	
Rear Brake Light Switch Timing	ON after about 10 mm (0.39 in.) of pedal travel
Engine Oil Pressure Switch Connections	When engine is stopped: ON When engine is running: OFF
Water Temperature Sensor Resistance	In the text
Fuel Level Sensor Resistance:	
Full Position	9 ~ 11 Ω
Empty Position	213 ~ 219 Ω

Special Tools and Sealant

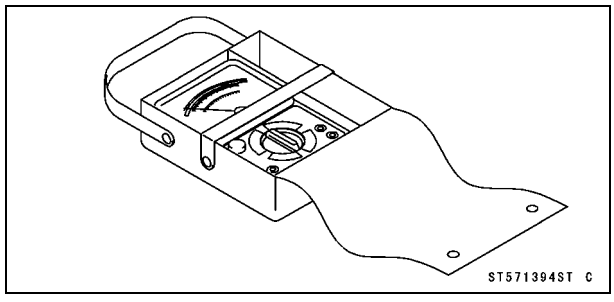
Flywheel Holder:
57001-1313



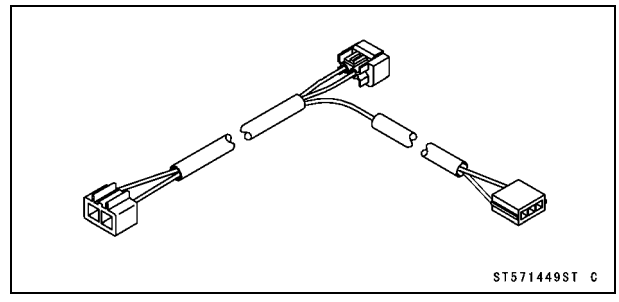
Peak Voltage Adapter:
57001-1415



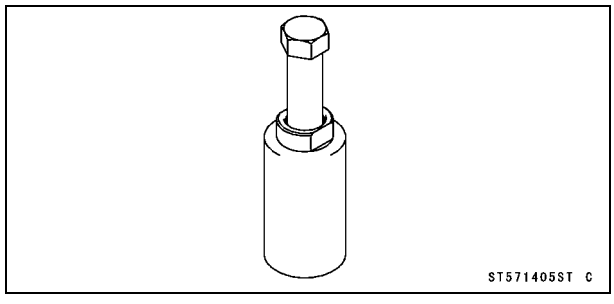
Hand Tester:
57001-1394



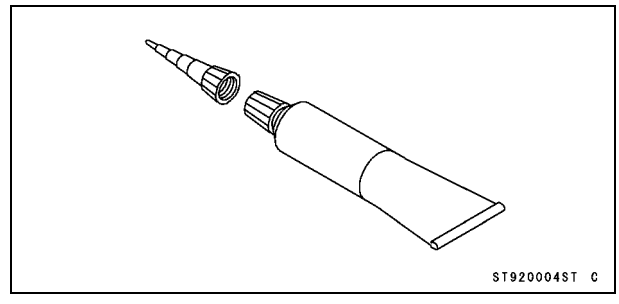
Lead Wire - Peak Voltage Adapter:
57001-1449



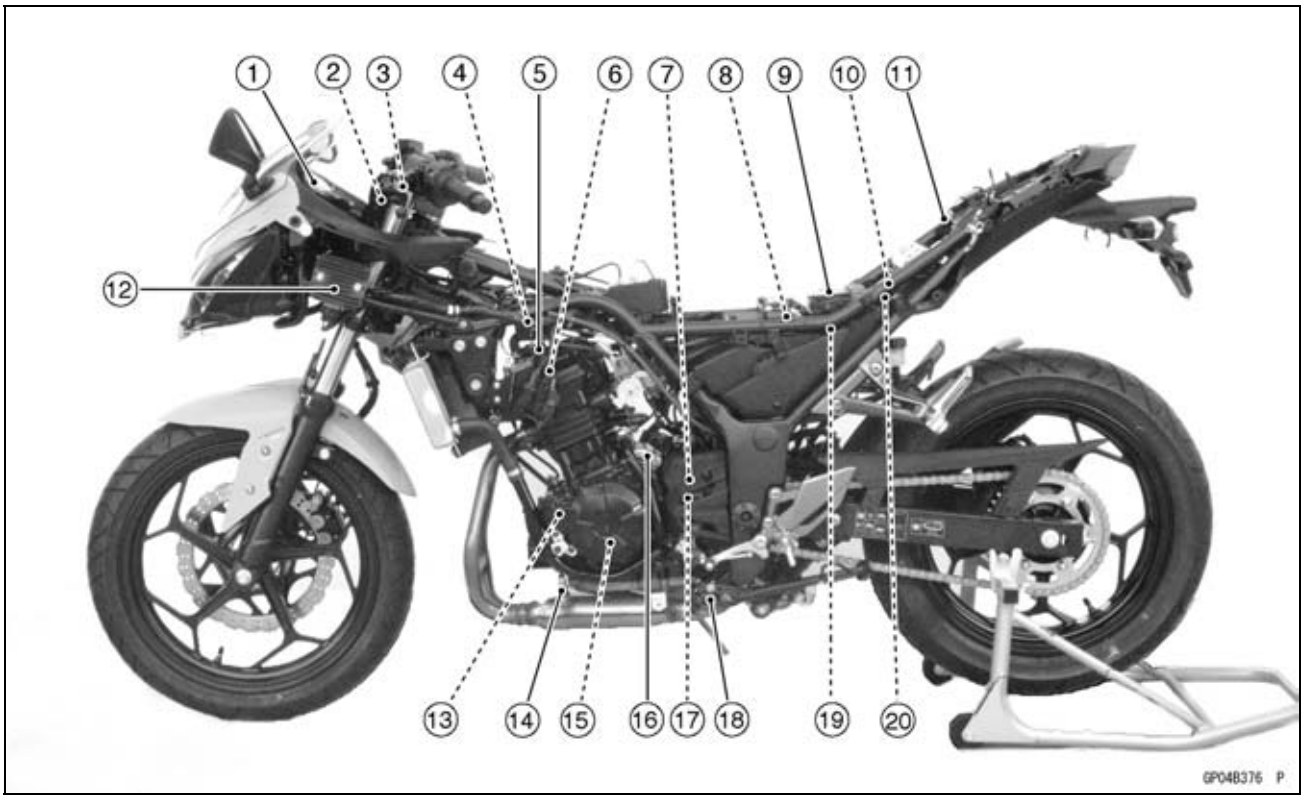
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405

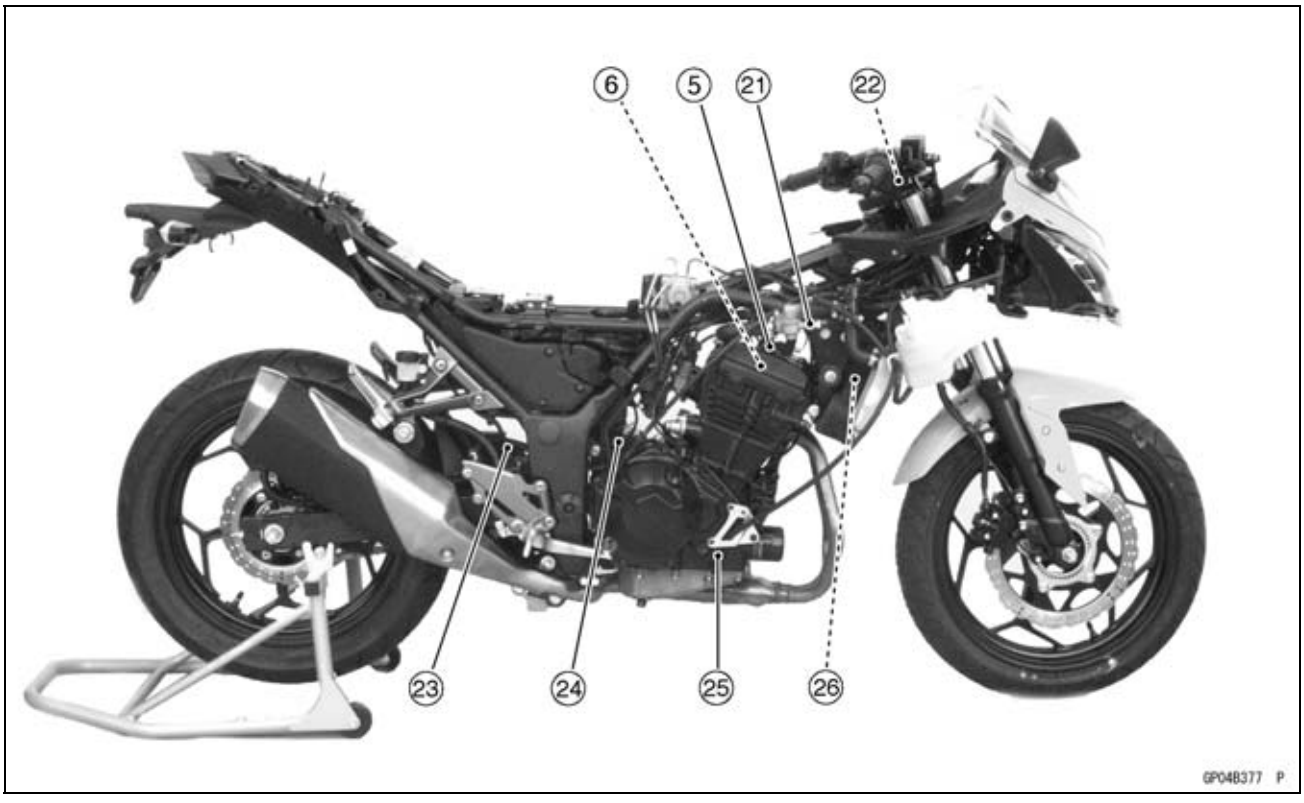


Liquid Gasket, TB1211F:
92104-0004



Parts Location

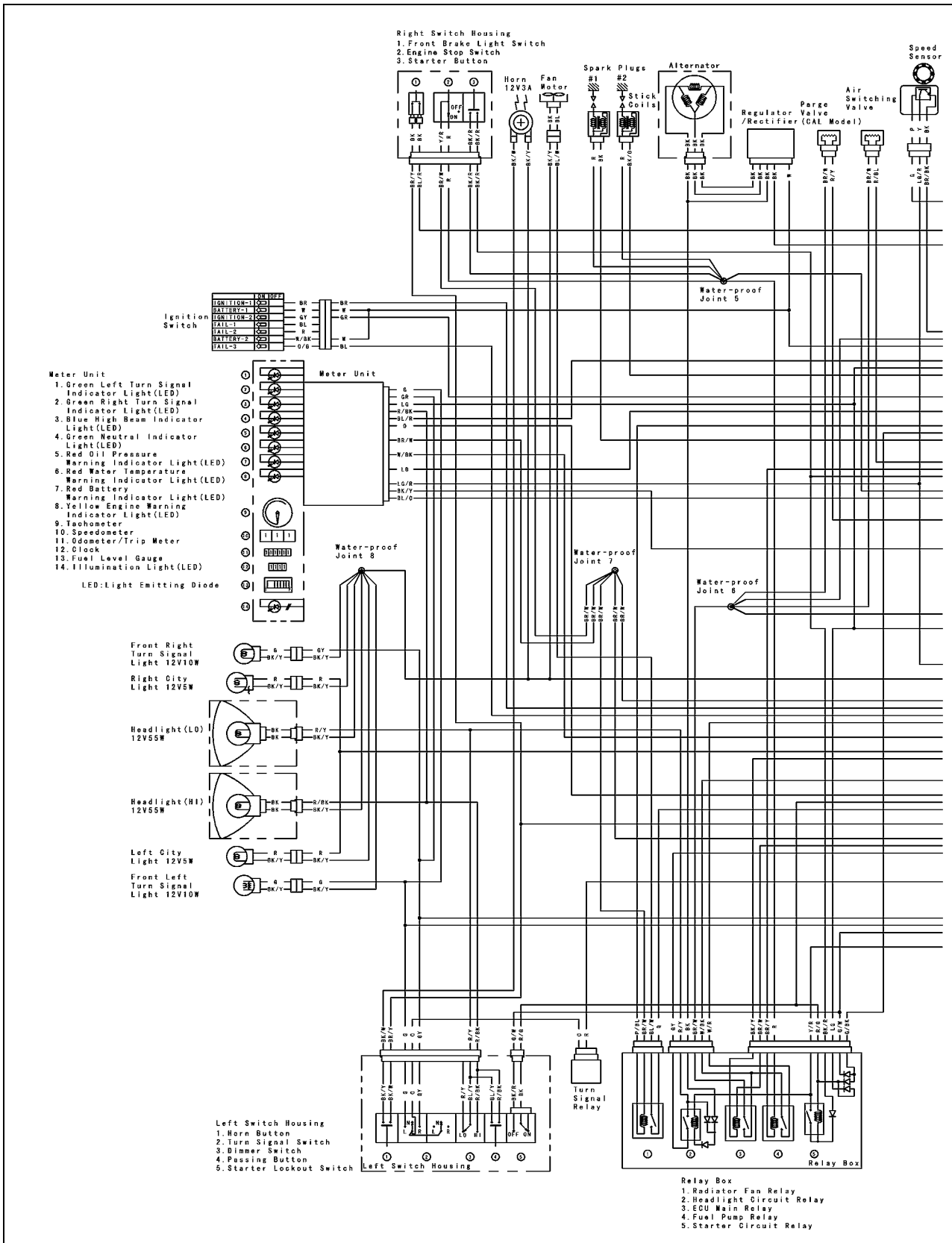




Parts Location

1. Meter Unit
2. Ignition Switch
3. Starter Lockout Switch
4. Air Switching Valve
5. Stick Coils
6. Spark Plugs
7. Neutral Switch
8. Starter Relay
9. Relay Box
10. Fuse Box
11. Turn Signal Relay
12. Regulator/Rectifier
13. Crankshaft Sensor
14. Oxygen Sensor (Equipped Model)
15. Alternator
16. Starter Motor
17. Speed Sensor
18. Sidestand Switch
19. Battery 12 V 8 Ah
20. ECU
21. Water Temperature Sensor
22. Front Brake Light Switch
23. Rear Brake Light Switch
24. Engine Ground
25. Oil Pressure Switch
26. Fan Motor

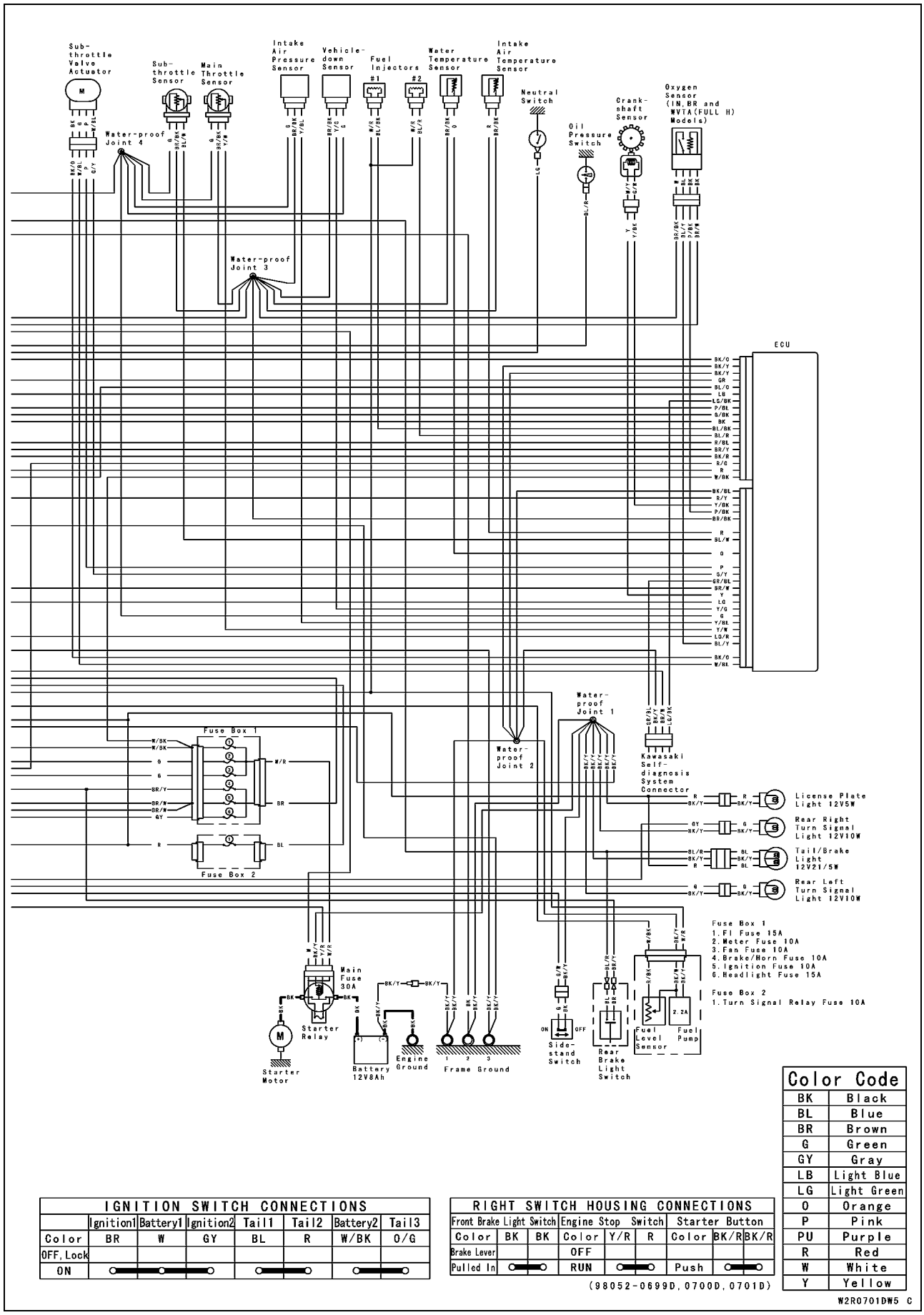
Wiring Diagram (EX300A without GPS Unit)



LEFT SWITCH HOUSING CONNECTIONS															
Horn Button			Turn Signal Switch				Dimmer Switch				Passing Button			Starter Lockout Switch		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	R/Y	Color	R/BK	BL/Y	Color	BK	BK/R
			L	●			HI	●						Clutch Lever		
Push	●		OFF (Push)								Push	●		Released		
			R		●		LO		●					Pulled in	●	

W2L0701DW5 C

Wiring Diagram (EX300A without GPS Unit)



IGNITION SWITCH CONNECTIONS							
	Ignition1	Battery1	Ignition2	Tail1	Tail2	Battery2	Tail3
Color	BR	W	GY	BL	R	W/BK	O/G
OFF, Lock							
ON	●	●	●	●	●	●	

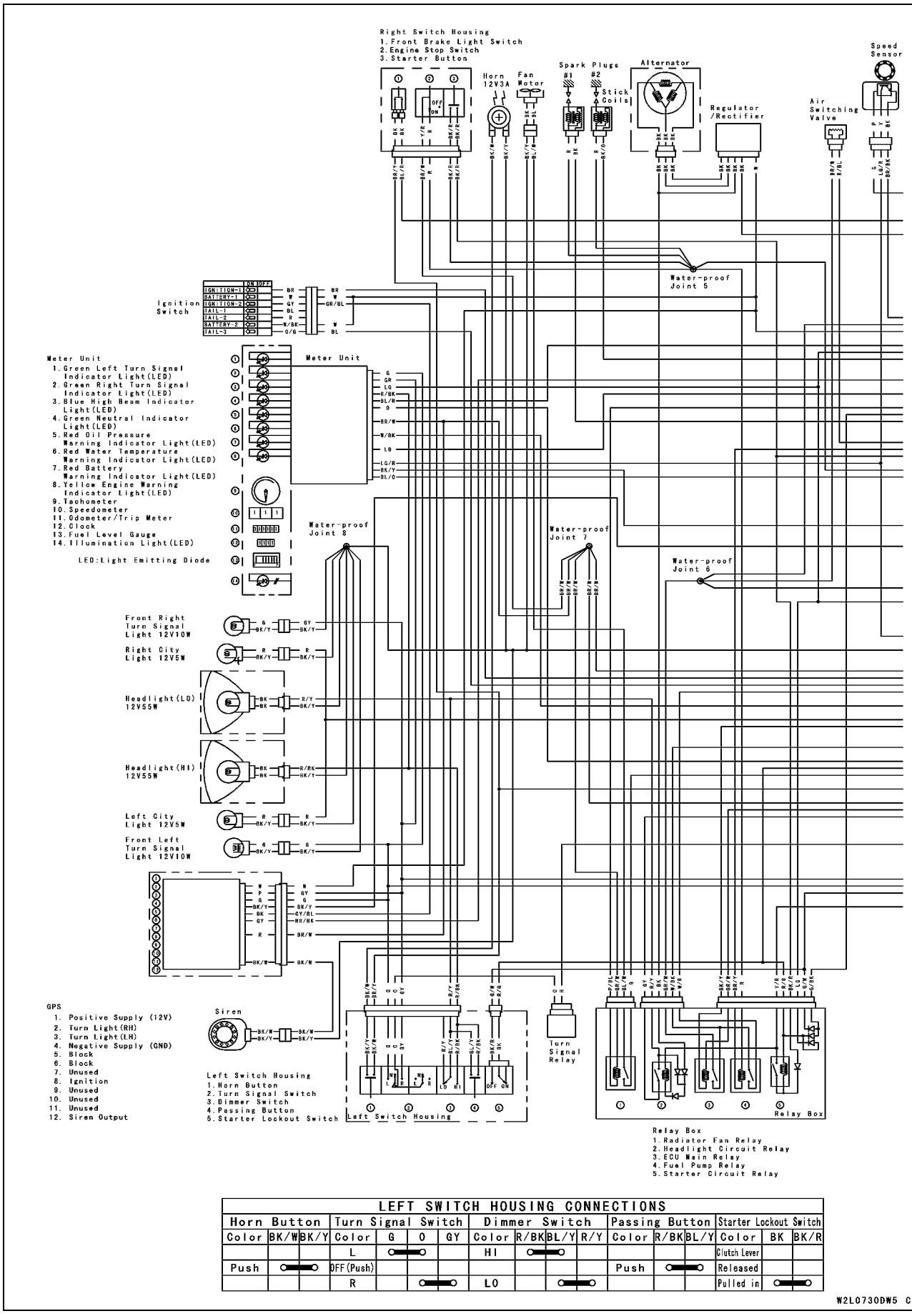
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF					
Pulled In	●	●	RUN	●	●	Push	●	●

(98052-0699D, 0700D, 0701D)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

W2R0701DW5 C

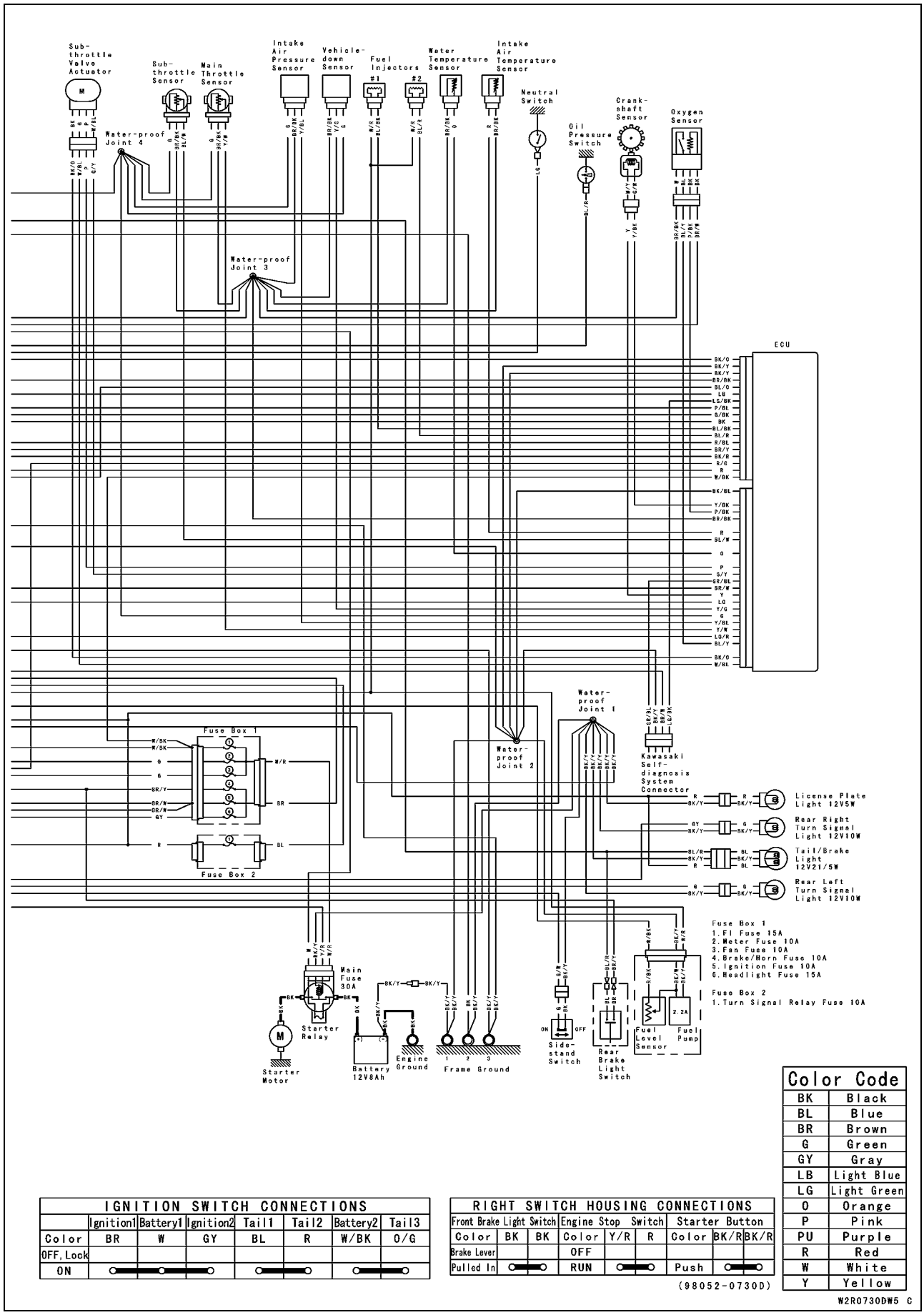
Wiring Diagram (EX300A with GPS Unit)



LEFT SWITCH HOUSING CONNECTIONS															
Horn Button			Turn Signal Switch				Dimmer Switch				Passing Button			Starter Lockout Switch		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	R/Y	Color	R/BK	BL/Y	Color	BK	BK/R
			L	●			HI	●						Clutch Lever		
Push	●		OFF(Push)								Push	●		Released		
			R		●		LO		●					Pulled in	●	

W2L0730DW5 C

Wiring Diagram (EX300A with GPS Unit)



IGNITION SWITCH CONNECTIONS							
	Ignition1	Battery1	Ignition2	Tail1	Tail2	Battery2	Tail3
Color	BR	W	GY	BL	R	W/BK	O/G
OFF, Lock							
ON	●	●	●	●	●	●	

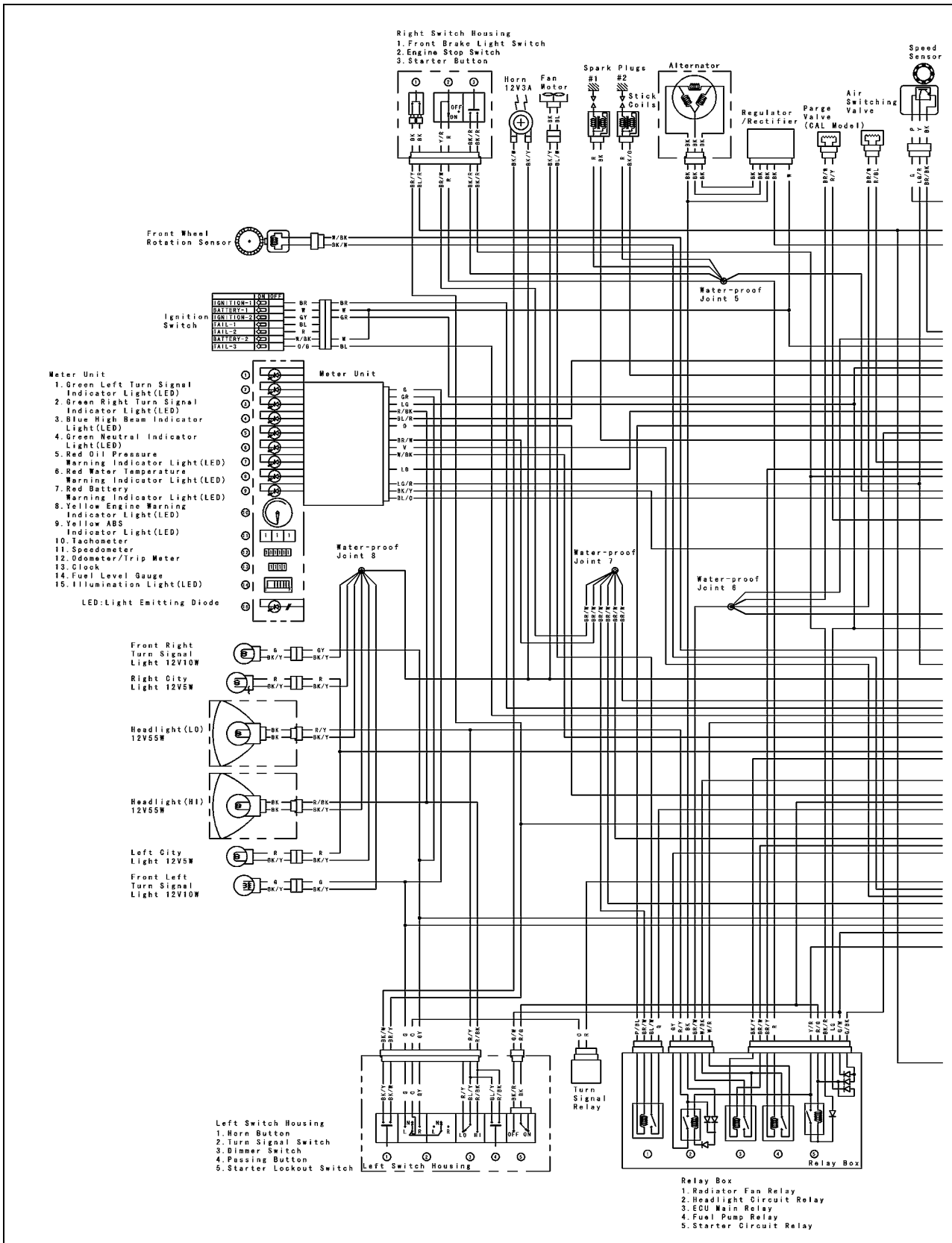
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF					
Pulled In	●	●	RUN	●	●	Push	●	●

(98052-0730D)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

W2R0730DW5 C

Wiring Diagram (EX300B without GPS Unit)

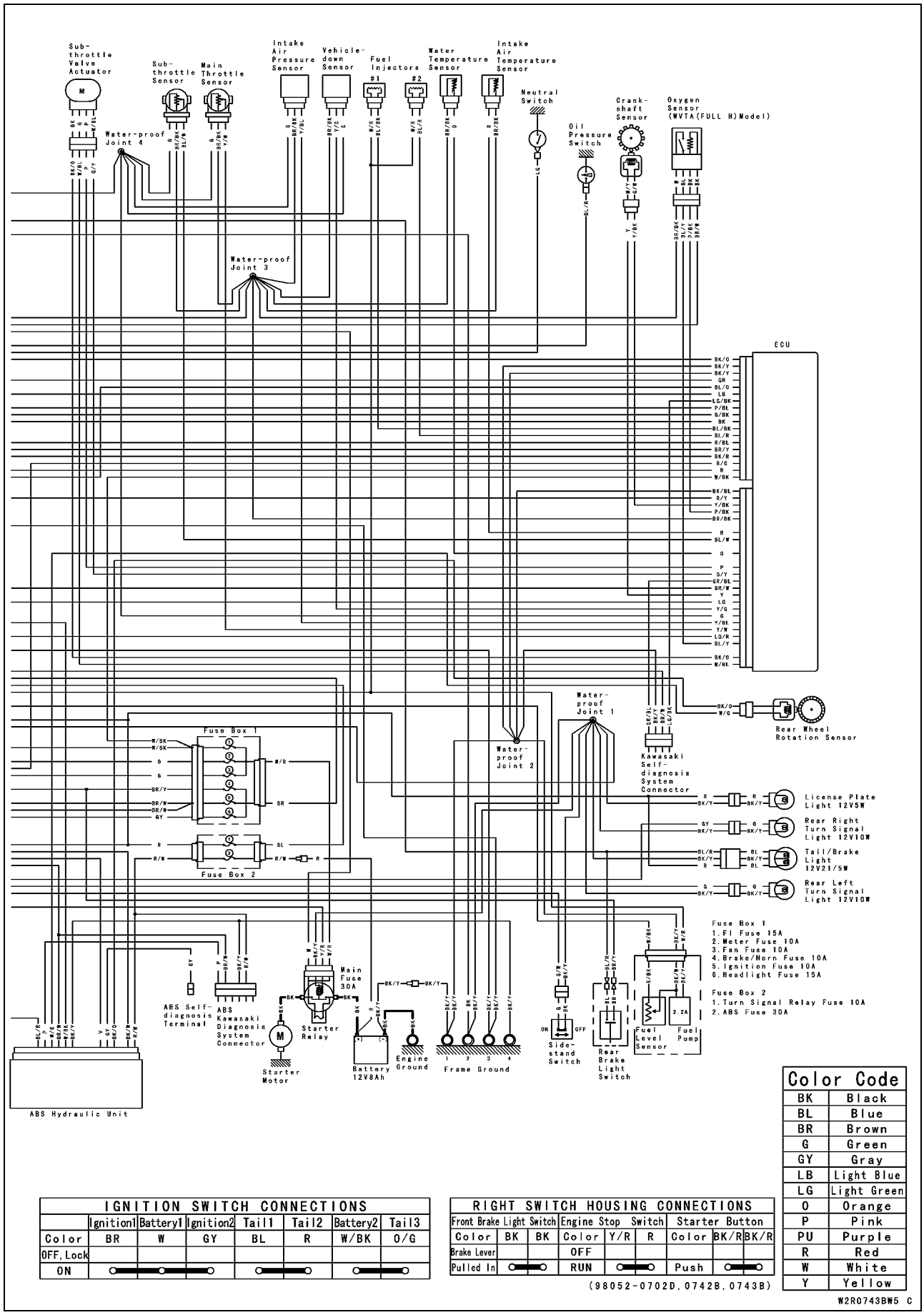


LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch				Passing Button			Starter Lockout Switch		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	R/Y	Color	R/BK	BL/Y	Color	BK	BK/R
			L	●			HI	●						Clutch Lever		
Push	●		OFF (Push)								Push	●		Released		
			R		●		LO		●					Pulled in	●	

W2L0743BW5 C

Wiring Diagram (EX300B without GPS Unit)



IGNITION SWITCH CONNECTIONS							
	Ignition1	Battery1	Ignition2	Tail1	Tail2	Battery2	Tail3
Color	BR	W	GY	BL	R	W/BK	O/G
OFF, Lock							
ON	●	●	●	●	●	●	

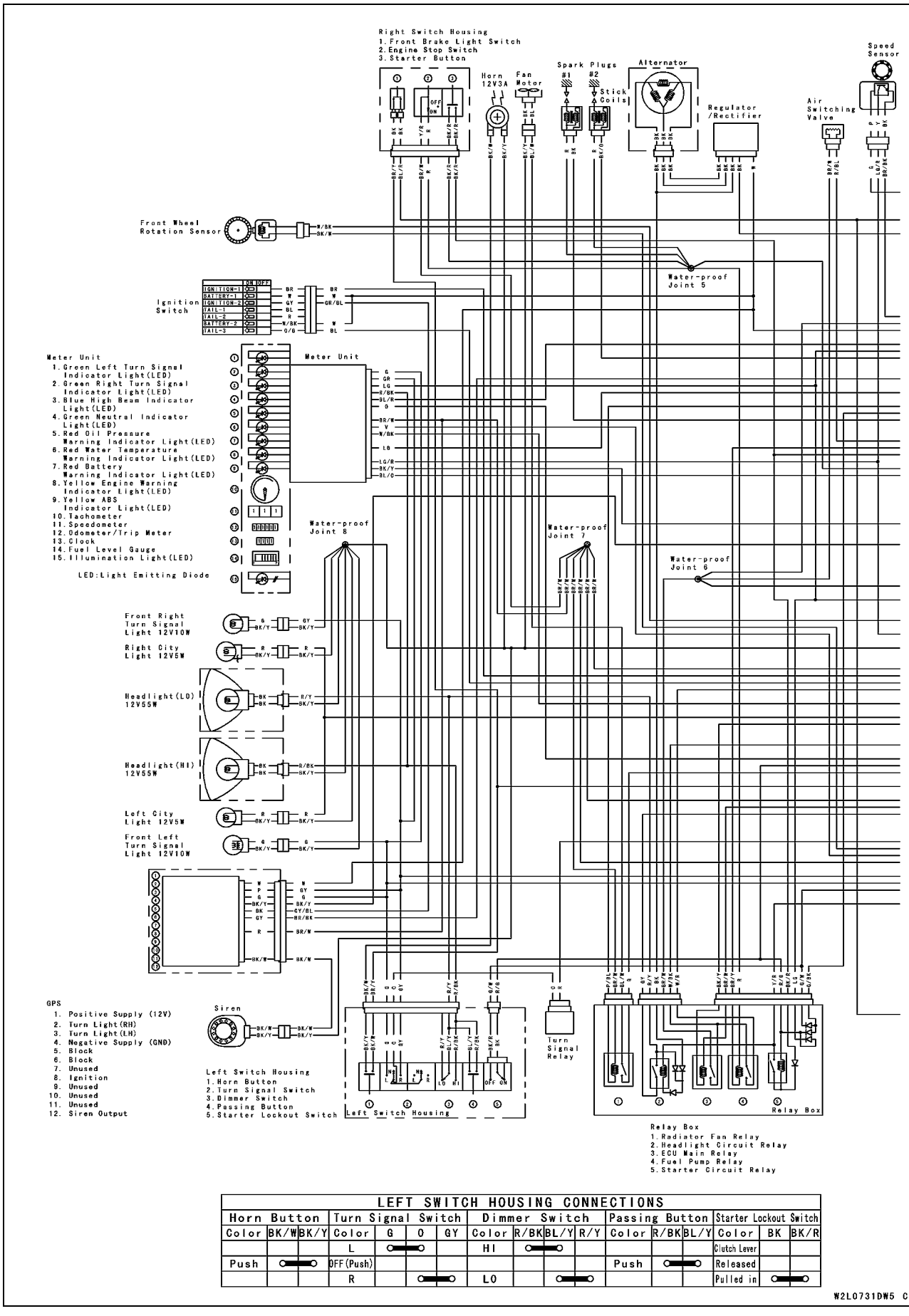
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF					
Pulled In	●	●	RUN	●	●	Push	●	●

(98052-0702D, 0742B, 0743B)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

W2R0743BW5 C

Wiring Diagram (EX300B with GPS Unit)

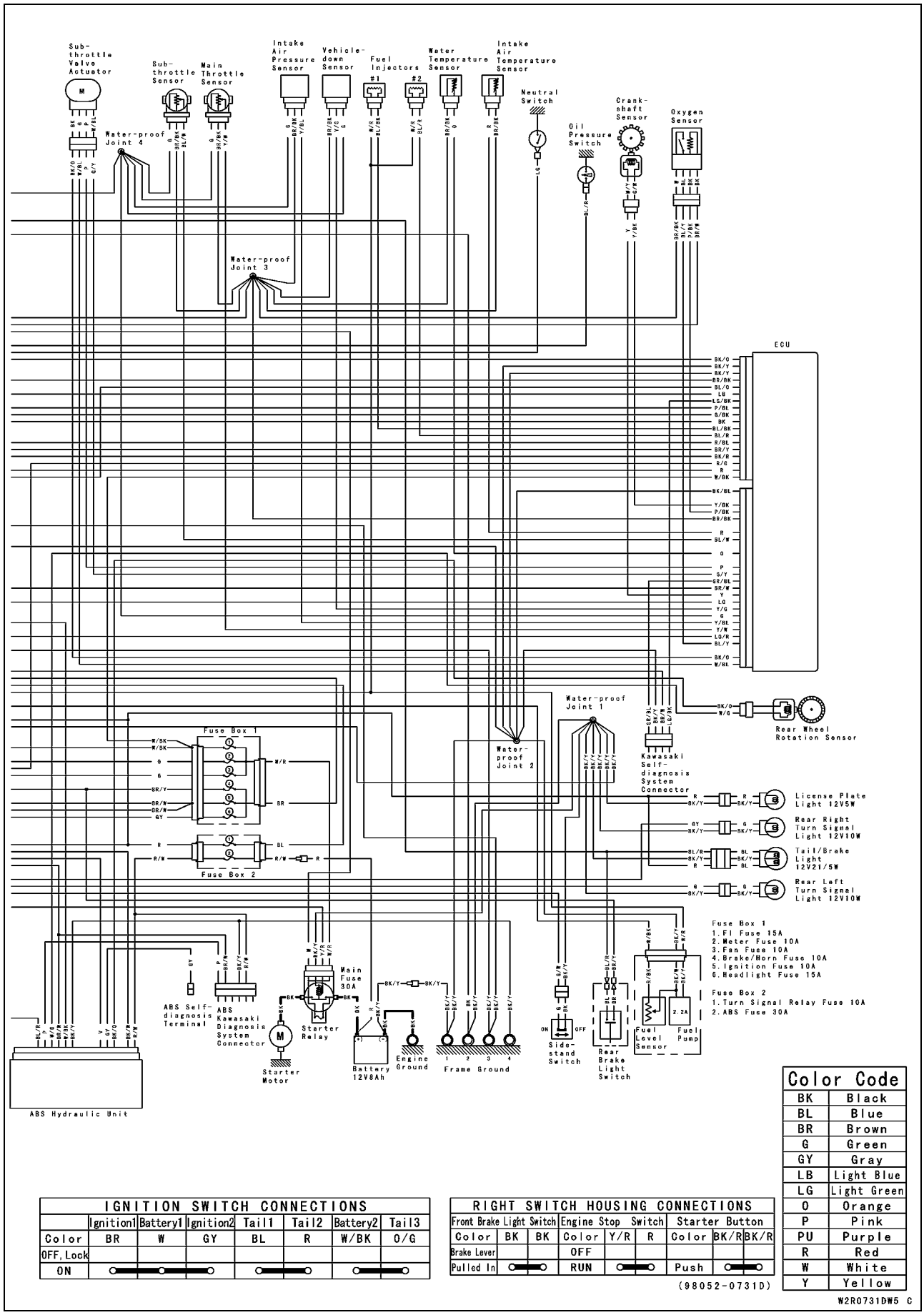


LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch				Passing Button			Starter Lockout Switch		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	R/Y	Color	R/BK	BL/Y	Color	BK	BK/R
			L	●			HI	●						Clutch Lever		
Push	●		OFF(Push)								Push	●		Released		
			R		●		LO		●					Pulled in	●	

W2L0731DW5 C

Wiring Diagram (EX300B with GPS Unit)



IGNITION SWITCH CONNECTIONS							
	Ignition1	Battery1	Ignition2	Tail1	Tail2	Battery2	Tail3
Color	BR	W	GY	BL	R	W/BK	O/G
OFF, Lock							
ON	●	●	●	●	●	●	

RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF					
Pulled In	●	●	RUN	●	●	Push	●	●

(98052-0731D)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

W2R0731DW5 C

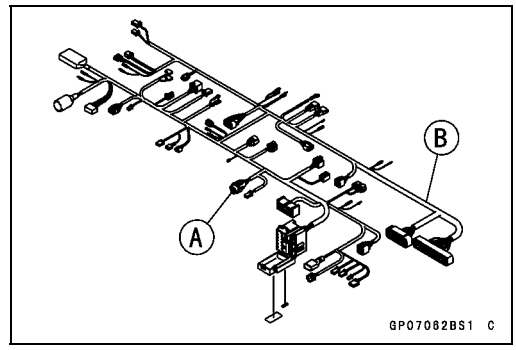
Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

Main Harness Inspection



- Visually inspect the main harness for signs of burning, fraying, etc.

★If any main harness is poor, replace the damaged main harness.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

- Check the main harness for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001-1394

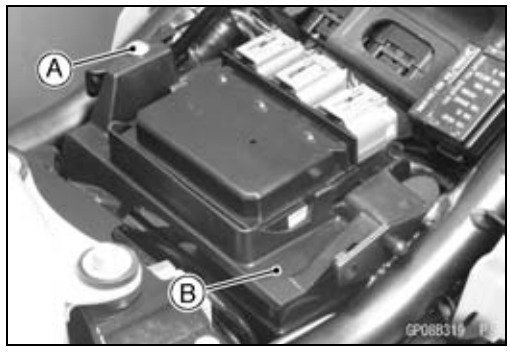
○Set the tester to the × 1 Ω range, and read the tester.

★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the main harness [B] if necessary.

Battery

Battery Removal

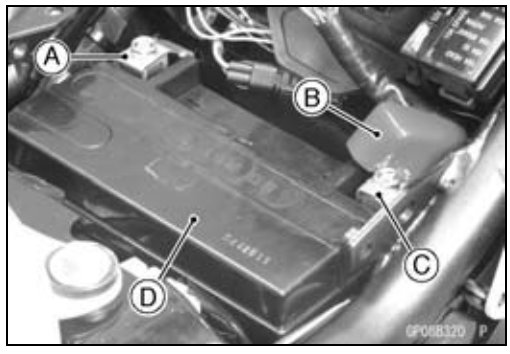
- Turn the ignition switch off.
- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  Relay Box (see Relay Box Removal)
  Screw [A] and Battery Cover [B]



- Disconnect the negative (–) cable [A].

NOTICE
Be sure to disconnect the negative (–) cable first.

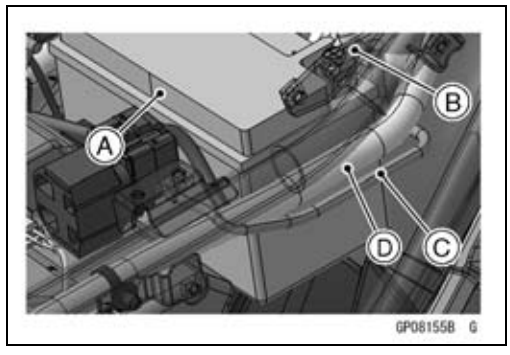
- Slide out the positive (+) terminal cap [B] and disconnect the positive (+) cable [C].
- Remove the battery [D].



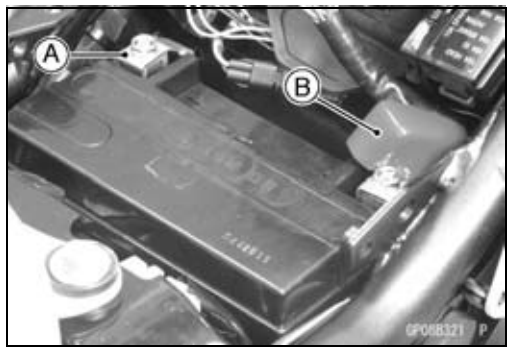
Battery Installation

- Turn the ignition switch off.
- Put the battery [A] into the battery case.
- Connect the battery positive (+) terminal [B] first.

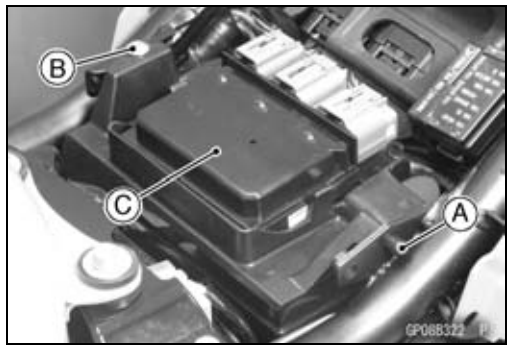
○Make sure the positive (+) cable [C] is routed properly as shown.
  Main Harness [D]



- Connect the negative (–) cable [A] to the battery.
- Apply a light coat of grease on the battery terminals to prevent corrosion.
- Cover the (+) terminal with the red cap [B].



- Insert the projection [A] on the battery cover into the hole on the case.
- Tighten the screw [B] and place the relay box [C] onto the battery cover.
- Install the removed parts (see appropriate chapters).



Battery

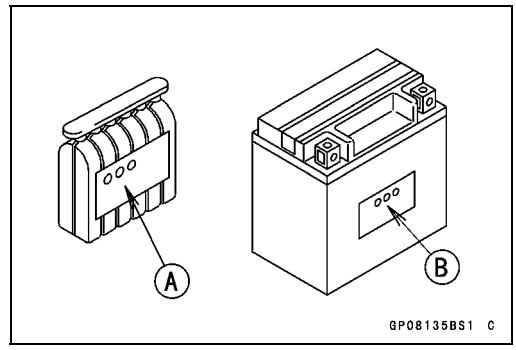
Battery Activation

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name

EX300A/B: FTX9-BS

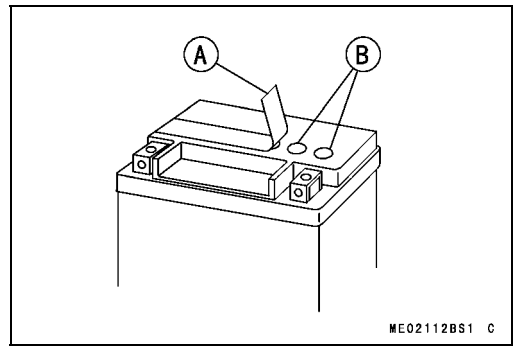


NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.



⚠ DANGER

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

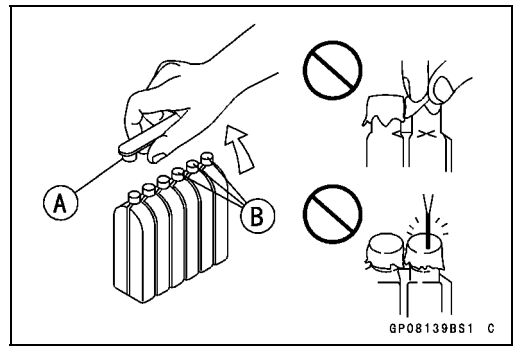
NOTE

○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*

- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

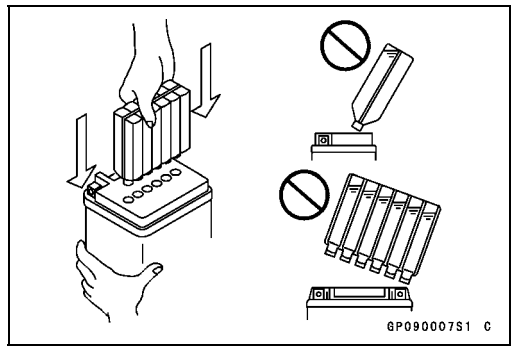
NOTE

○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*



Battery

● Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

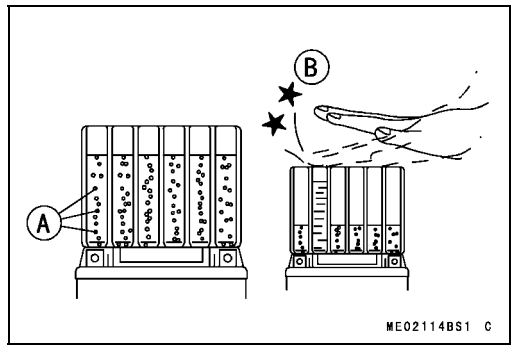


NOTE

○*Do not tilt the electrolyte container.*

● Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.



NOTE

○*Be careful not to have the battery fall down.*

● Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.

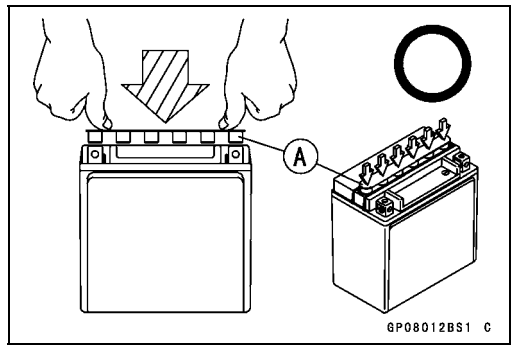
NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

● After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.

● Make sure that the container cells have emptied completely, and remove the container from the battery.

● Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

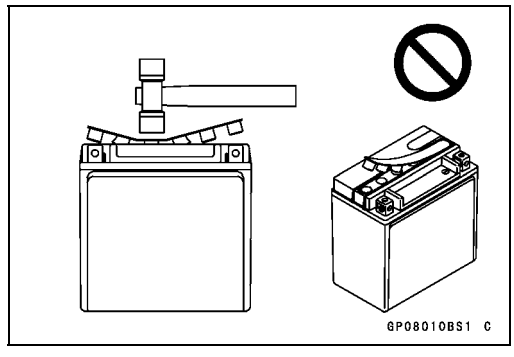


NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

NOTE

○*Charging the battery immediately after filling can shorten service life.*



Battery

Initial Charge

● Newly activated sealed batteries require an initial charge.

Standard Charge: 0.9 A × 5 ~ 10 hours

★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:
Battery Mate 150-9
OptiMate PRO 4-S/PRO S/PRO2
Yuasa MB-2040/2060
Christie C10122S

★If the above chargers are not available, use equivalent one.

● Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.6 V, repeat charging cycle.*

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
Re-check voltage and if less than 12.6 V repeat the charging cycle and load test. If still below 12.6 V the battery is defective.

Precautions

1) No need of topping-up
No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

2) Refreshing charge
If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.
If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

3) When you do not use the motorcycle for months.
Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.

4) Battery life
If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medial attention for more severe burns.

Interchange

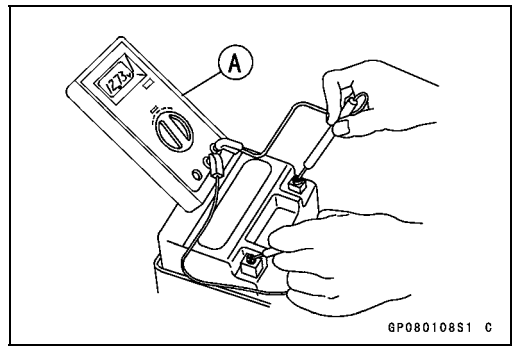
A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

○Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].

- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.

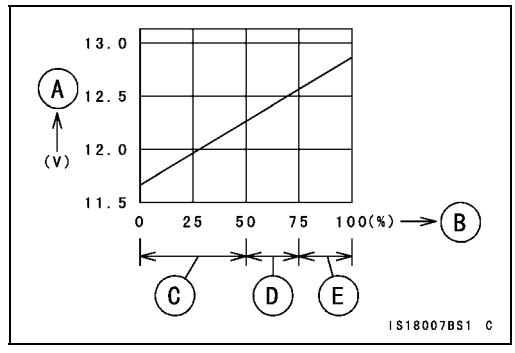


NOTE

○*Measure with a digital voltmeter which can be read one decimal place voltage.*

★If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage
Standard: 12.6 V or more



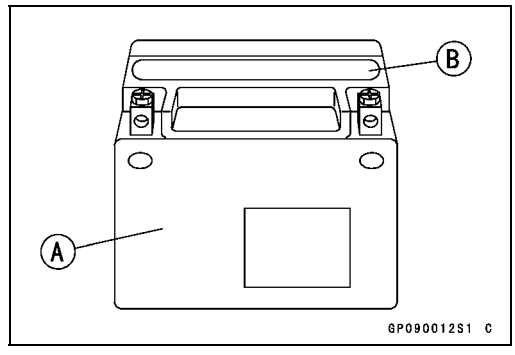
Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Refresh charge is required [C]
Note [D]
Good [E]

Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.

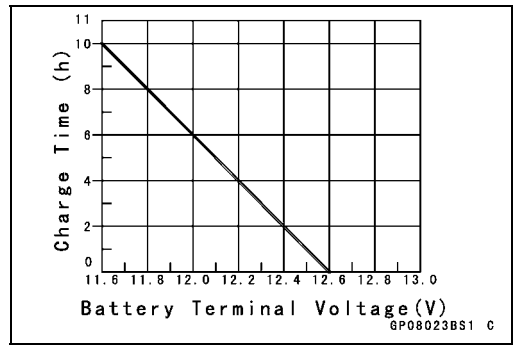


Battery

Terminal Voltage: 11.5 ~ less than 12.6 V
Standard Charge 0.9 A × 5 ~ 10 h (see following chart)
Quick Charge 4 A × 1 h

NOTICE

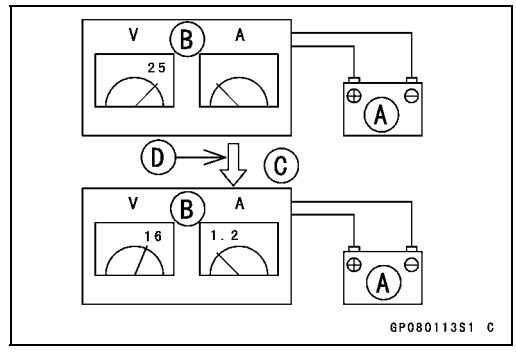
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.



Terminal Voltage: less than 11.5 V
Charging Method: 0.9 A × 20 h

NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*



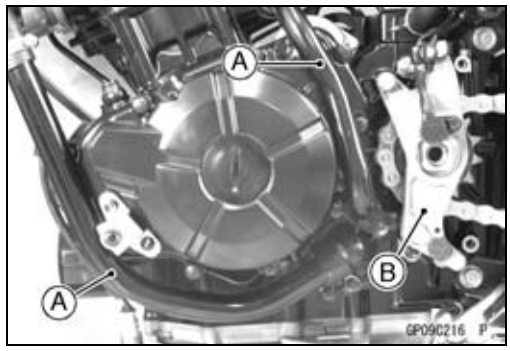
Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

● Determine the battery condition after refresh charge.
○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

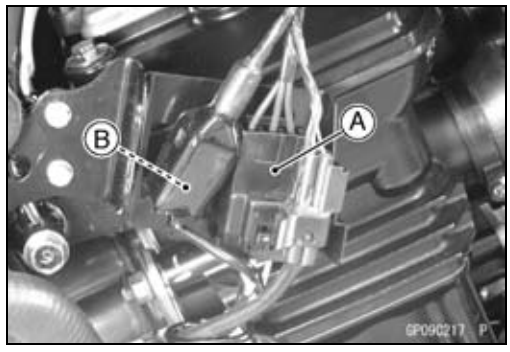
Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

Charging System

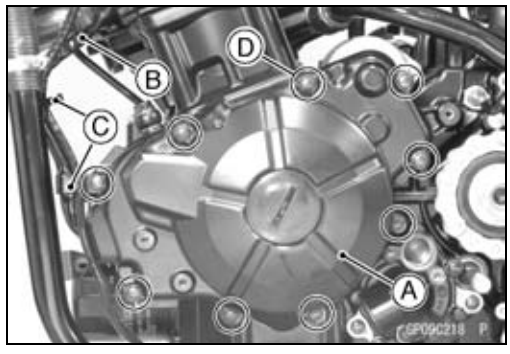
Alternator Cover Removal



- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Water Pipes [A] (see Water Pump Cover Removal in the Cooling System chapter)
  Speed Sensor Bracket [B] (see Engine Sprocket Removal in the Final Drive chapter)

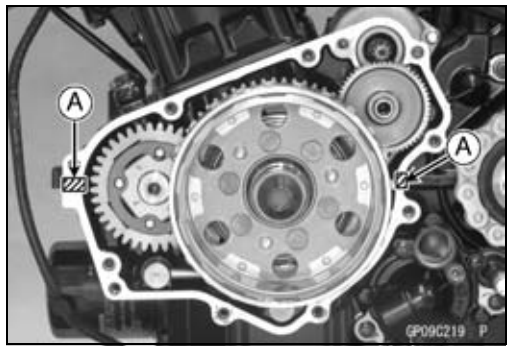


- Disconnect the alternator connector [A] and crankshaft sensor lead connector [B].



- Place a suitable container under the alternator cover [A].
- Release the lead [B] from the clamps [C].
- Remove:
  Alternator Cover Bolts [D]
  Alternator Cover
  Gasket
  Dowel Pins

Alternator Cover Installation

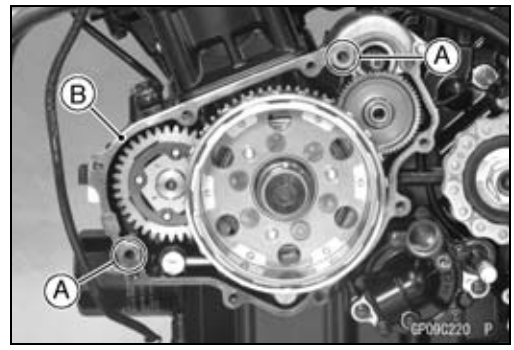


- Clean off any oil or dirt and apply liquid gasket to the crankshaft sensor lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

Charging System

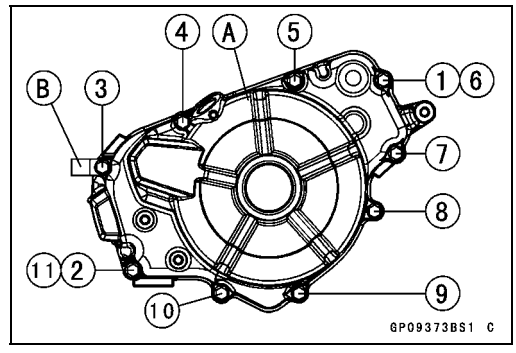
- Install the dowel pins [A] and new gasket [B] are in place on the crankcase.



- Install the alternator cover [A] and clamp [B].
- Tighten the alternator cover bolts following the specified sequence [1 ~ 11].

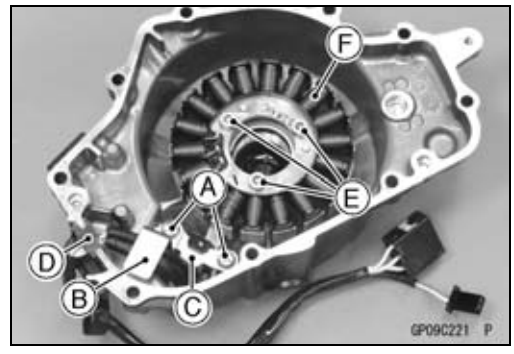
Torque - Alternator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).



Stator Coil Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Screws [A] and Clamp [B]
  Crankshaft Sensor [C]
  Lead Grommet [D]
  Stator Coil Bolts [E]
  Stator Coil [F]



Stator Coil Installation

- Install the stator coil [A] and tighten the bolts.

Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

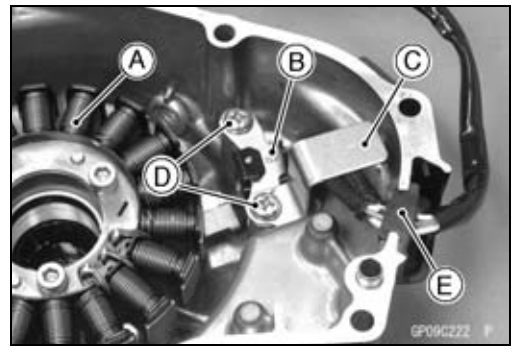
- Install the crankshaft sensor [B] and clamp [C].
- Tighten:

Torque - Crankshaft Sensor Screws [D]: 5.2 N·m (0.53 kgf·m, 46 in·lb)

○Clean off any oil or dirt and apply liquid gasket to the circumference of the crankshaft sensor lead grommet [E].

Sealant - Liquid Gasket, TB1211F: 92104-0004

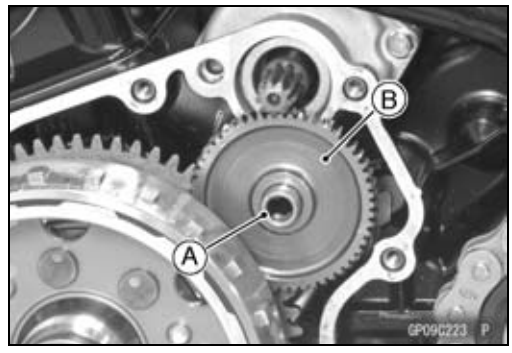
- Install the grommet to the crankcase, and install the alternator cover (see Alternator Cover Installation).



Charging System

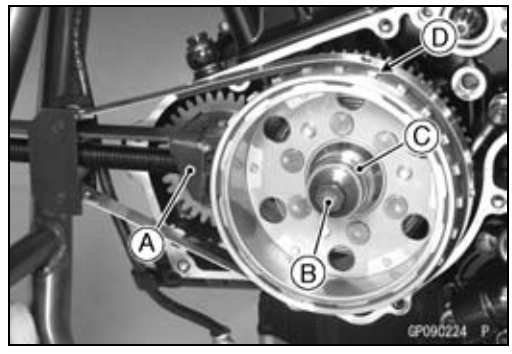
Alternator Rotor Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Shaft [A]
  Starter Idle Gear [B]



- Hold the alternator rotor steady with the flywheel holder [A].
- Remove the rotor bolt [B] and washer [C].

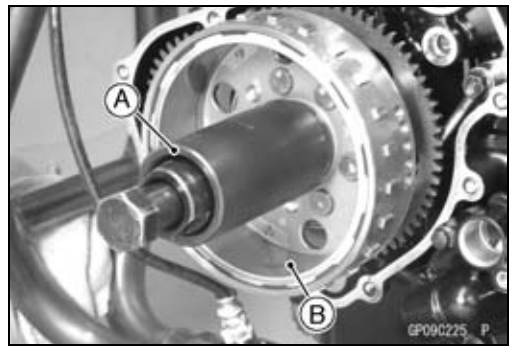
Special Tool - Flywheel Holder: 57001-1313



NOTICE
Do not hold the projections [D].

- Using the flywheel puller [A], remove the alternator rotor [B] from the crankshaft.

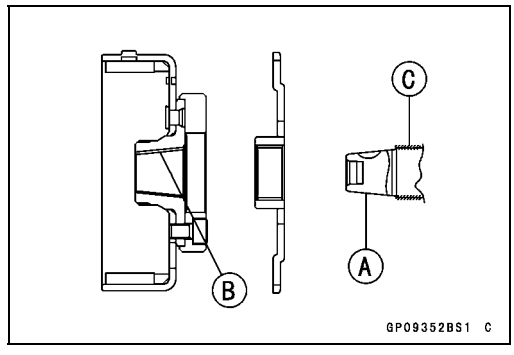
Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405



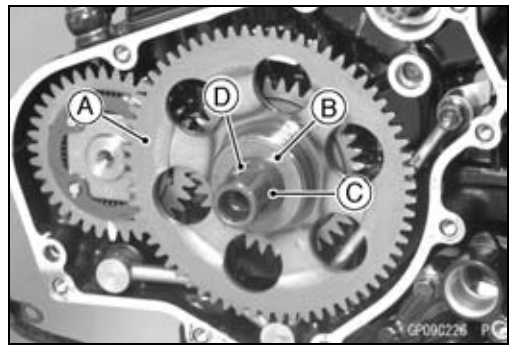
NOTICE
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Apply a thin coat of molybdenum disulfide grease to the crankshaft [C].

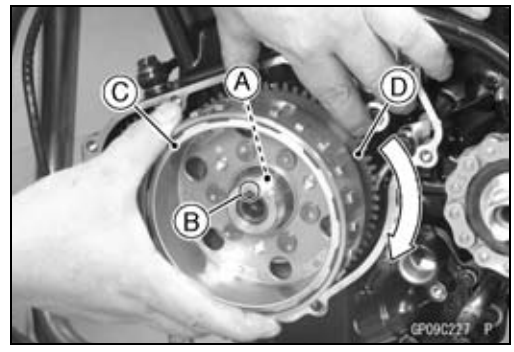


- Install the starter clutch gear [A] and washer [B].
- Again, clean the crankshaft tapered portion [C] and dry there.
- Fit the woodruff key [D] securely in the slot in the crankshaft before installing the alternator rotor.



Charging System

- Align the woodruff key [A] on the crankshaft with groove [B] on the alternator rotor [C].
- Push the alternator rotor while turning the starter clutch gear [D] clockwise until it engaged into the starter clutch case.



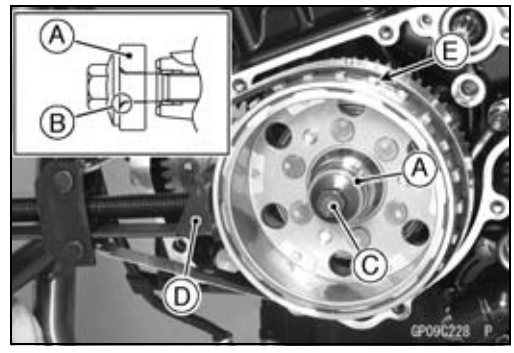
- Install the washer [A] with its chamfer side [B] facing out.

NOTE

○*Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.*

- Install the rotor bolt [C] and tighten it with 55 N·m (5.6 kgf·m, 41 ft·lb) of torque.

Special Tool - Flywheel Holder [D]: 57001-1313



NOTICE

Do not hold the projections [E].

- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.

★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.

- Tighten the alternator rotor bolt while holding the alternator rotor steady with the flywheel holder.

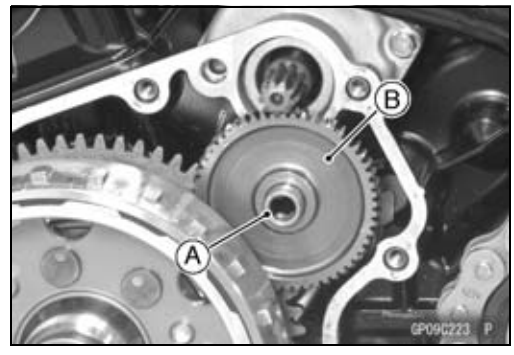
Special Tool - Flywheel Holder: 57001-1313

NOTICE

Do not hold the projections.

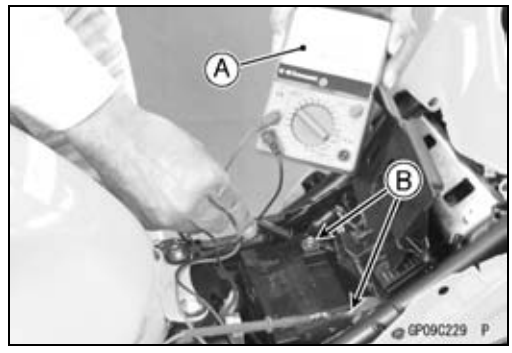
Torque - Alternator Rotor Bolt: 107.8 N·m (10.99 kgf·m, 79.51 ft·lb)

- Apply a thin coat of molybdenum disulfide grease to the shaft [A], and install it and starter idle gear [B].
- Install the alternator cover (see Alternator Cover Installation).



Charging System

Charging Voltage Inspection



NOTE

○*If the Red Battery Voltage Warning Indicator Light (LED) goes on, it indicates the battery voltage is out of the standard range of 11-16 V, therefore it is necessary to inspect the charging system as described below.*

- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the battery cover (see Battery Removal).
- Check that the ignition switch is turned off, and connect the hand tester [A] to the battery terminals [B].

Special Tool - Hand Tester: 57001-1394

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

Charging Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
25 V DC	Battery (+)	Battery (–)	14.0 ~ 14.6 V

- Turn off the ignition switch to stop the engine, and disconnect the hand tester.

★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

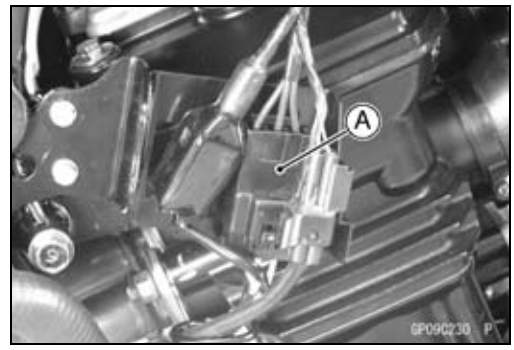
★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System



● To check the alternator output voltage, do the following procedures.
○Turn off the ignition switch.
○Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
○Disconnect the alternator lead connector [A].
○Connect the hand tester as shown in the table 1.

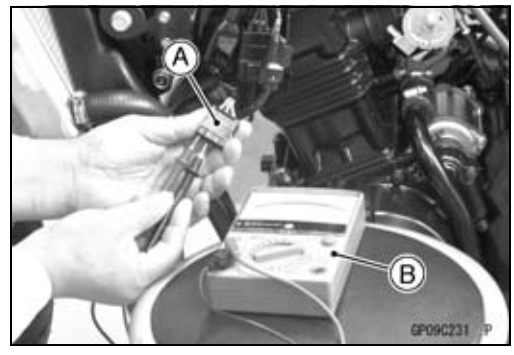
Special Tool - Hand Tester: 57001-1394

○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage at 4 000 r/min (rpm)

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
250 V AC	One Black Lead	Another Black Lead	35 V or more

★If the output voltage shows the value in the table, the alternator operates properly. The regulator/rectifier is damaged.
★If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.



● Check the stator coil resistance as follows.
○Stop the engine.
○Disconnect the alternator lead connector [A].
○Connect the hand tester [B] as shown in the table 2.

Special Tool - Hand Tester: 57001-1394

○Note the readings (total 3 measurements).

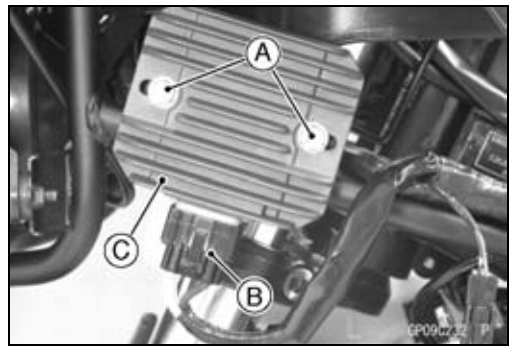
Table 2 Stator Coil Resistance at 20°C (68°F)

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
× 1 Ω	One Black Lead	Another Black Lead	0.05 ~ 0.6 Ω

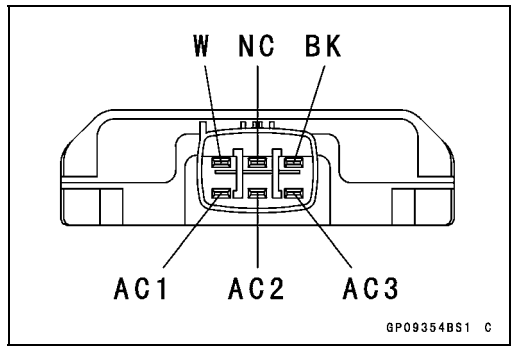
★If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
● Using the highest resistance range of the hand tester, measure the resistance between each of the black lead and chassis ground.
★Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Charging System

Regulator/Rectifier Inspection



- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Bolts [A]
  Connector [B] (Disconnect)
  Regulator/Rectifier [C]



- Set the hand tester to the × 1 kΩ range and make the measurements shown in the table.

Special Tool - Hand Tester: 57001-1394

- Connect the hand tester to the regulator/rectifier.

★If the tester readings are not as specified, replace the regulator/rectifier.

NOTICE

Use only Kawasaki Hand Tester 57001-1394 for this test. A tester other than the Kawasaki Hand Tester may show different readings. If a megger or a meter with a large capacity battery is used, the regulator/rectifier will be damaged.

Regulator/Rectifier Resistance (Unit: kΩ)

		Tester (+) Lead Connection					
	Terminal	W	NC	BK	AC1	AC2	AC3
(−)*	W	−	∞	∞	∞	∞	∞
	NC	∞	−	∞	∞	∞	∞
	BK	5~15	∞	−	3~11	3~11	3~11
	AC1	3~11	∞	∞	−	∞	∞
	AC2	3~11	∞	∞	∞	−	∞
	AC3	3~11	∞	∞	∞	∞	−

(−)*: Tester (−) Lead Connection

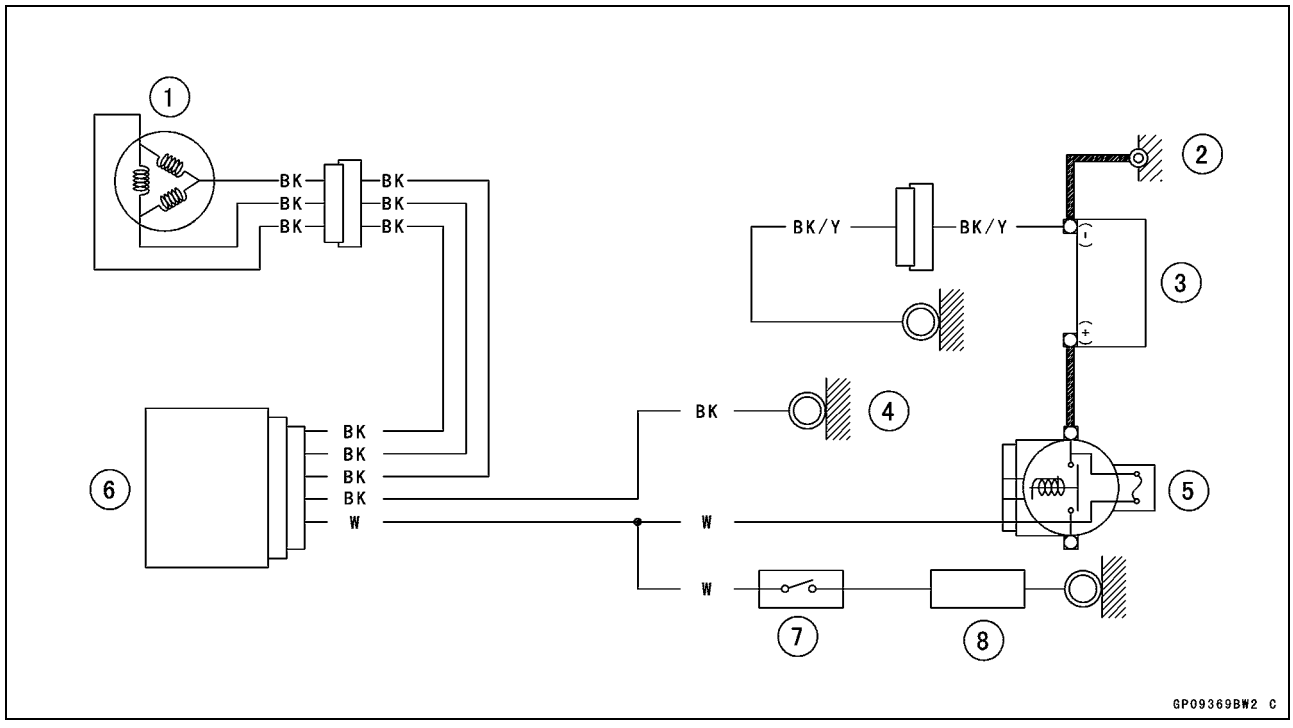
- Install the regulator/rectifier and tighten the mounting bolt.

Torque - Regulator/rectifier Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Connect the connector to the regulator/rectifier.

Charging System

Charging System Circuit



1. Alternator
2. Engine Ground
3. Battery 12 V 8 Ah
4. Frame Ground
5. Main Fuse 30 A
6. Regulator/Rectifier
7. Ignition Switch
8. Load

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, stick coil or stick coil lead while the engine is running, or you could receive a severe electrical shock.

NOTICE

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU damage.
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Sensor Removal

- Refer to the Stator Coil Removal.

Crankshaft Sensor Installation

- Refer to the Stator Coil Installation.

Crankshaft Sensor Inspection

- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the crankshaft sensor lead connector [A].
- Set the hand tester [B] to the × 10 Ω range and connect (+) lead to the white/yellow lead and (–) lead to the green/white lead in the connector.

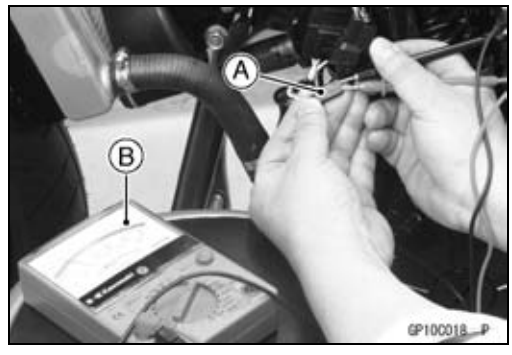
Special Tool - Hand Tester: 57001-1394

Crankshaft Sensor Resistance: 180 ~ 280 Ω

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

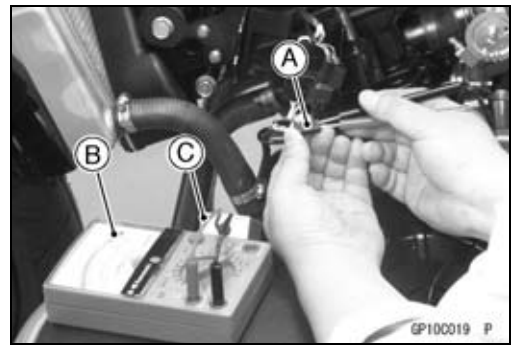
- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor assembly.



Ignition System

Crankshaft Sensor Peak Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the crankshaft sensor lead connector [A].
- Set the hand tester [B] to the DC 25 V range.
- Connect the peak voltage adapter [C] to the hand tester and crankshaft sensor leads in the connector.

Special Tools - Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Connections:

Crankshaft Sensor Lead		Peak Voltage Adapter		Hand Tester
White/Yellow	←	Red	→	(+)
Green/White	←	Black	→	(–)

- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 4.5 V or more

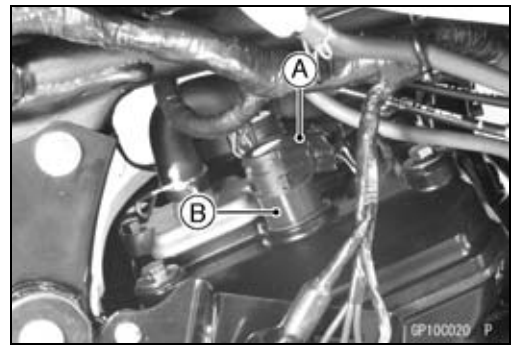
★If the tester reading is not specified one, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Stick Coil Removal

NOTICE

Never drop the stick coils especially on a hard surface. Such a shock to the stick coils can damage it.

- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)



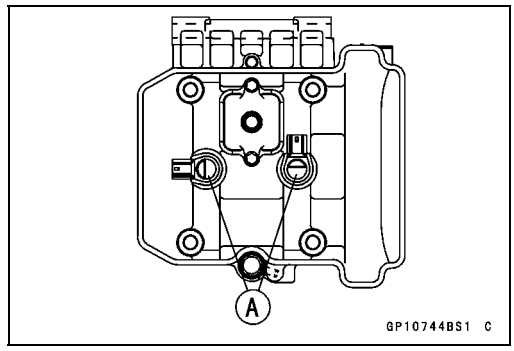
- Disconnect the stick coil connectors [A].
- Pull the stick coils [B] off the spark plugs.

NOTICE

Do not pry the connector part of the coil while removing the coil.

Ignition System

Stick Coil Installation

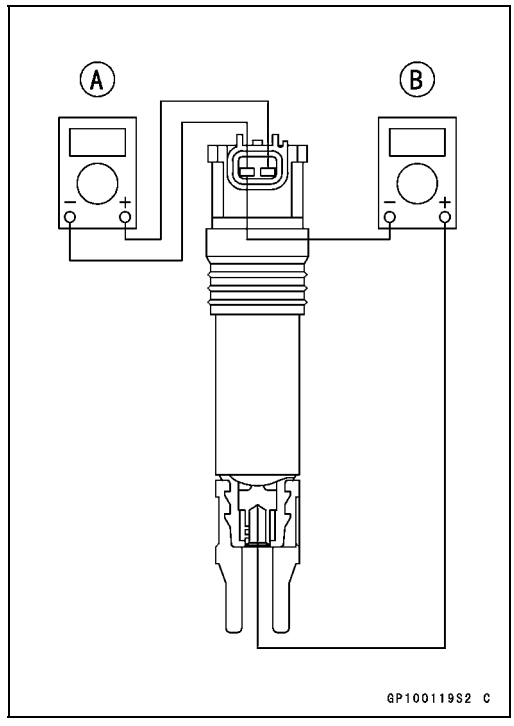


- Insert the coil as shown being careful of the coil heads [A] direction.
- Be sure the stick coils are installed by pulling up it lightly.
- Connect the connectors.

NOTICE
Do not tap the coil head while installing the coil.

- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Stick Coil Inspection



- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.

○Connect the hand tester between the coil terminals.
○Set the tester to the × 1 Ω range, and read the tester.

- Measure the secondary winding resistance [B] as follows.

○Connect the tester between the plug terminal and (–) coil terminal.
○Set the tester to the × 1 kΩ range and read the tester.

Stick Coil Winding Resistance

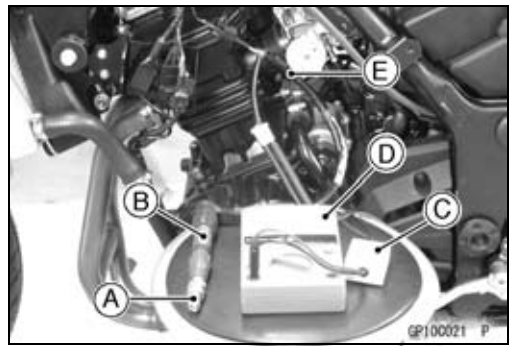
Primary Windings:	**1.1 ~ 1.5 Ω**
Secondary Windings:	**6.4 ~ 9.6 kΩ**

★If the tester does not read as specified, replace the coil.

Stick Coil Primary Peak Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*



- Remove the stick coils (see Stick Coil Removal), but do not remove the spark plugs.
- Measure the primary peak voltage as follows.

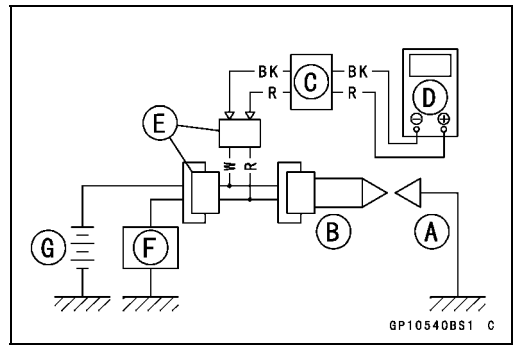
○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] into the hand tester [D] which is set to the DC 250 V range.
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.

ECU [F]
Battery [G]

Ignition System

Special Tools - Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Lead Wire - Peak Voltage Adapter: 57001 -1449

Primary Lead Connection
Adapter (R, +) to lead wire-peak voltage adapter (R)
Adapter (BK, –) to lead wire-peak voltage adapter (W)



⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch and the engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 90 V or more

- Repeat the test for the other stick coil.

★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Spark Plug Removal

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Installation

- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Condition Inspection

- Remove the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).
- Visually inspect the spark plugs.

★If the spark plug center electrode [A] and/or side electrode [B] are corroded or damaged, or if the insulator [C] is cracked, replace the plug.

★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

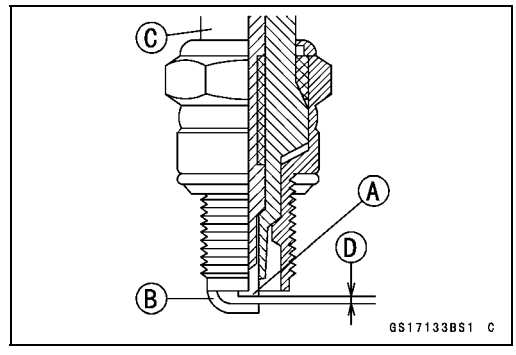
- Measure the gap [D] with a wire-type thickness gauge.

★If the gap is incorrect, replace the spark plug.

Spark Plug Gap: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

- Use the standard spark plug or its equivalent.

Spark Plug: NGK CR8E



Ignition System

Interlock Operation Inspection

- Raise the rear wheel off the ground using the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- Turn the engine stop switch on (run position).

1st Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release
Sidestand → Down or Up

○Turn the ignition switch on and push the starter button.
○Then the starter motor should not turn when the starter system circuit is normality.
★If the engine is start, inspect the starter lockout switch, neutral switch and relay box.
★If their parts are normality, replace the ECU.

2nd Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Pulled in
Sidestand → Up

○Turn the ignition switch on and push the starter button.
○Then the starter motor should turn when the starter system circuit is normality.
★If the starter motor is not turn, inspect the starter lockout switch, neutral switch, sidestand switch and relay box.
★If their parts are normality, replace the ECU.

3rd Check

- Inspect the engine for its secure stop after the following operations are completed.
- Run the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Pulled in
Sidestand → Up

- Set the sidestand on the ground, then the engine will stop.

★If the engine does not stop, inspect the neutral switch, sidestand switch and relay box.
★If their parts are normality, replace the ECU.

Ignition System

IC Igniter Inspection

○The IC igniter is built in the ECU [A].

● Refer to the following items.

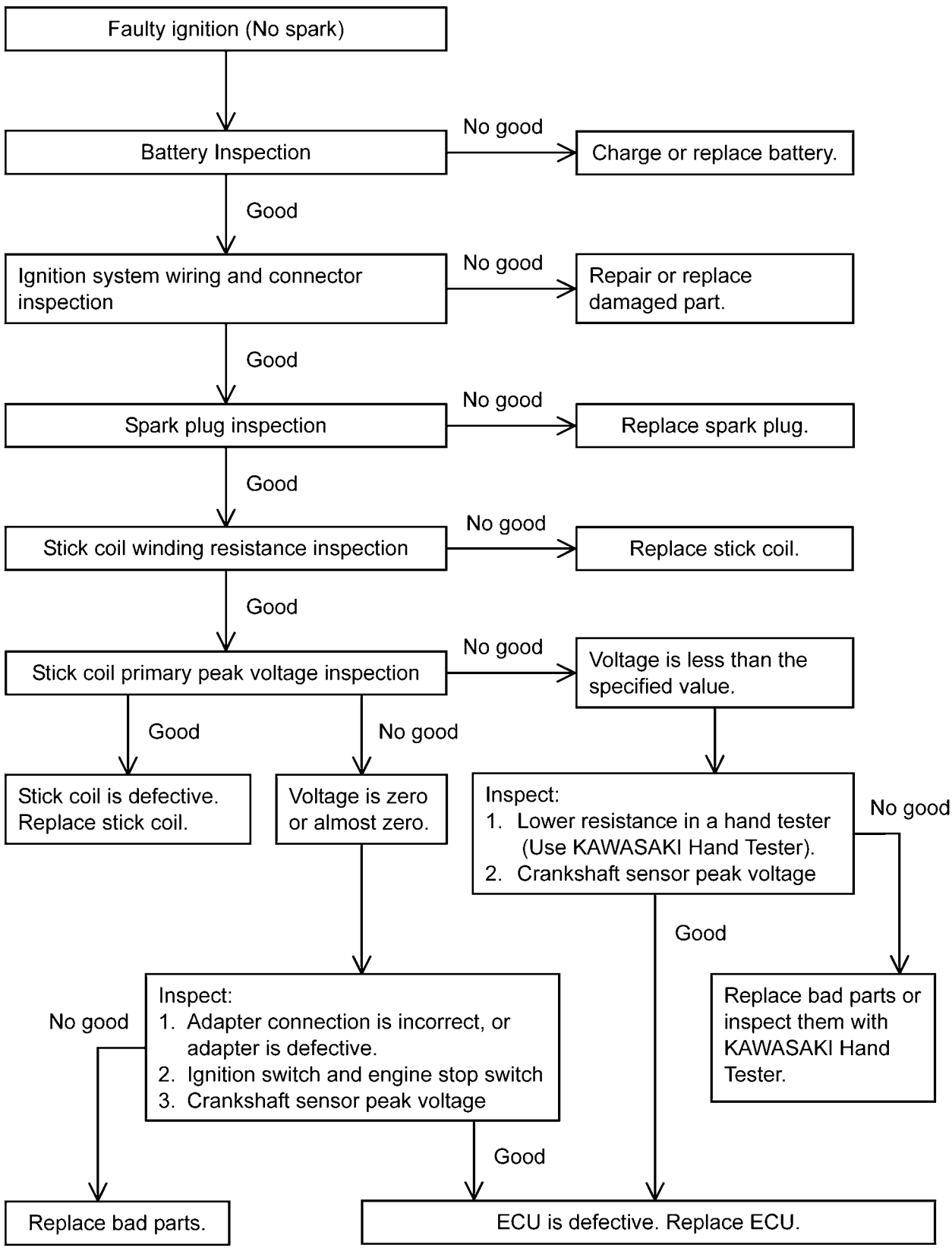
Interlock Operation Inspection (see Interlock Operation Inspection)

Ignition System Troubleshooting (see Ignition System section)

ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

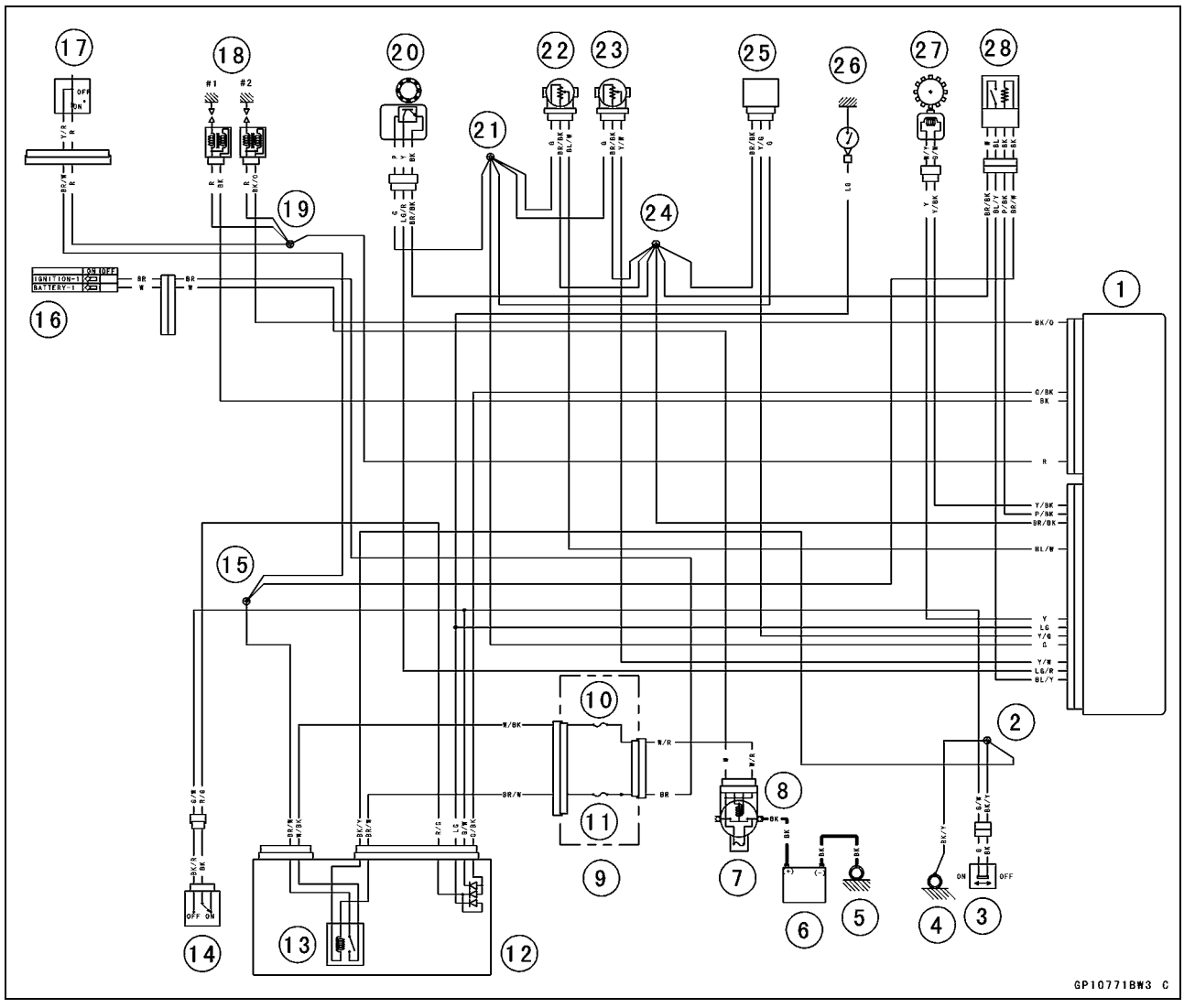
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit



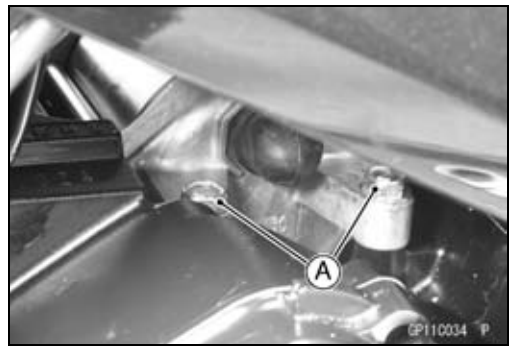
1. ECU
2. Water-proof Joint 1
3. Sidestand Switch
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15 A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Starter Lockout Switch
15. Water-proof Joint 7
16. Ignition Switch
17. Engine Stop Switch
18. Spark Plugs
19. Water-proof Joint 5
20. Speed Sensor
21. Water-proof Joint 4
22. Subthrottle Sensor
23. Main Throttle Sensor
24. Water-proof Joint 3
25. Vehicle-down Sensor
26. Neutral Switch
27. Crankshaft Sensor
28. Oxygen Sensor (Equipped Models)

Electric Starter System

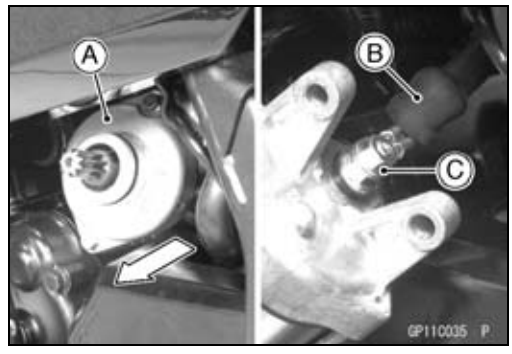
Starter Motor Removal

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.



- Remove the clutch cable and clutch cable bracket.
- Remove the starter motor mounting bolts [A].

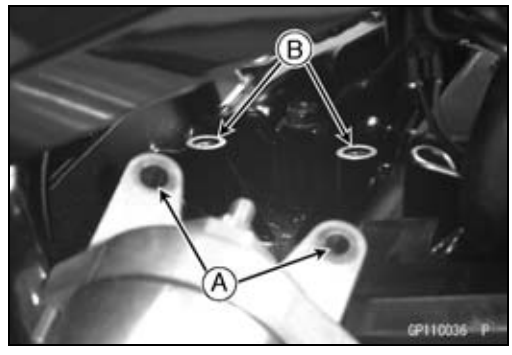


- Pull the starter motor [A] to the right side then pull out it toward the left side.
- Slide back the rubber cap [B] and remove the starter motor cable terminal nut [C].
- Remove the starter motor.

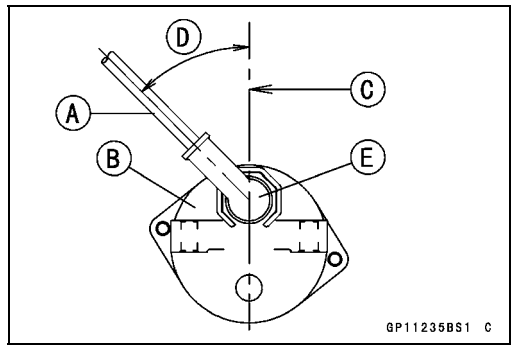
Starter Motor Installation

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.



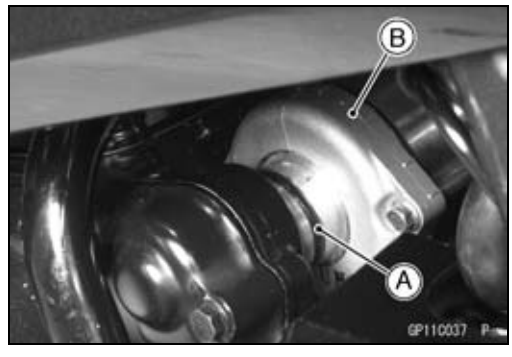
- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.



- Connect the starter motor cable [A] to the starter motor [B].
- Position the starter motor cable as shown.
  [C] Vertical Line
  [D] Approx. 45°

Torque - Starter Motor Cable Terminal Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Slide the rubber cap [E] to the original position.



- Replace the O-ring [A] with a new one and apply grease to the O-ring.
- Position the starter motor [B] on the crankcase and tighten the starter motor mounting bolts.

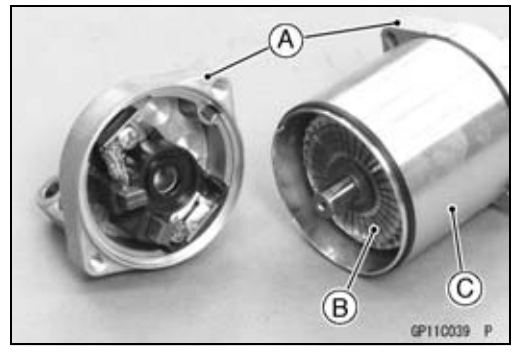
Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Electric Starter System

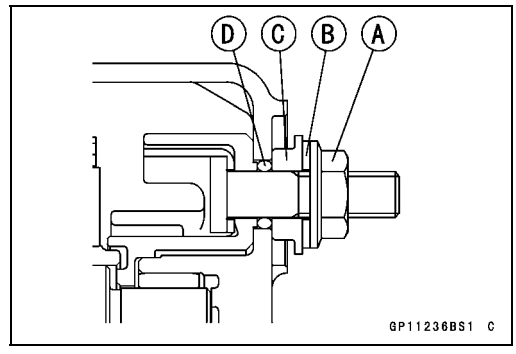
Starter Motor Disassembly

- Remove the starter motor (see Starter Motor Removal).
- Remove the starter motor through bolts [A].

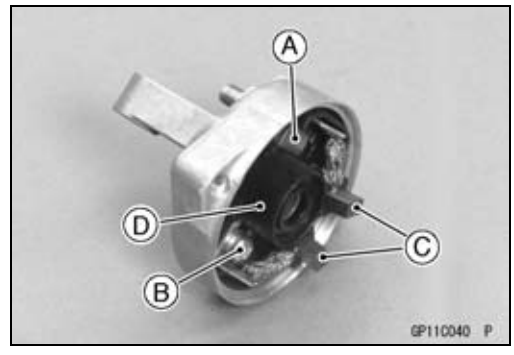
- Remove the both end covers [A].
- Remove the armature [B] from the yoke [C].



- Remove:
  Starter Motor Terminal Locknut [A]
  Washer [B]
  Insulator [C]
  O-ring [D]

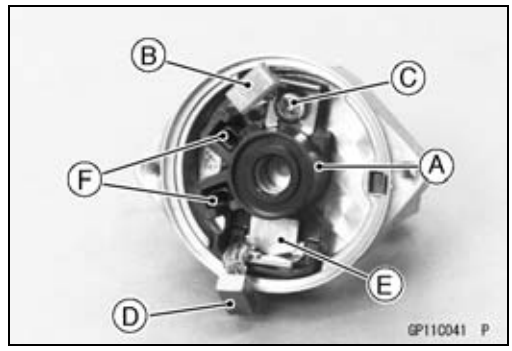


- Remove:
  Terminal [A]
  Brush Holder Screw [B]
  Brushes [C]
  Brush Springs
  Brush Holder [D]



Electric Starter System

Starter Motor Assembly



- Install:
  Brush Holder [A]
  Negative Brush [B]
  Brush Holder Screw [C]
  Positive brush [D]
  Terminal [E]
  Brush Springs [F]

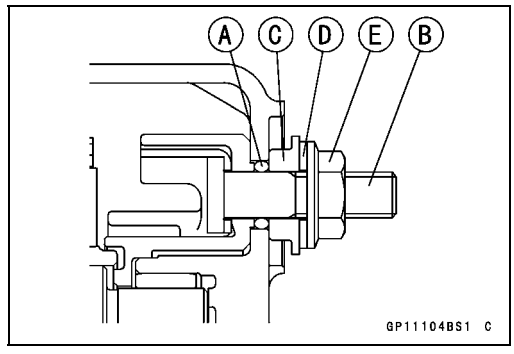
NOTE

○*Make sure the brush base plates are properly fitted into the grooves on the brush holder.*

- Tighten:

Torque - Starter Motor Brush Holder Screw: 3.8 N·m (0.39 kgf·m, 34 in·lb)

- Install the brushes on the brush springs.

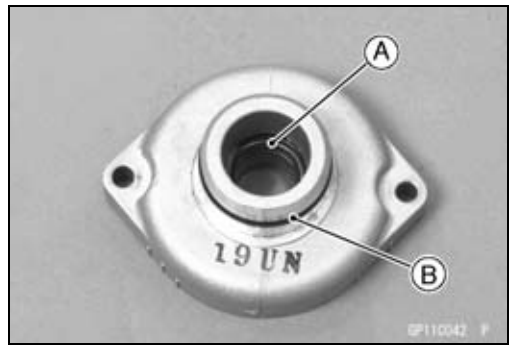


- Replace the O-ring [A] with a new one.
- Install the following parts to the starter motor terminal [B].
  O-ring
  Insulator [C]
  Washer [D]
  Starter Motor Terminal Locknut [E]

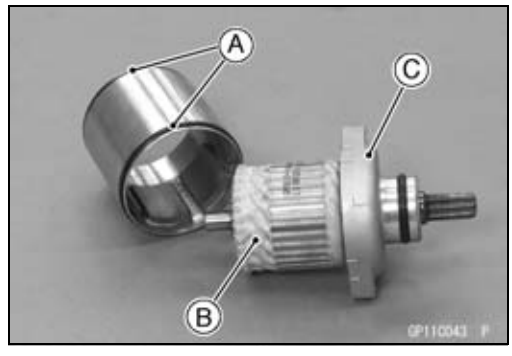
○Install the insulator so that stepped side faces outward.

- Tighten:

Torque - Starter Motor Terminal Locknut: 11 N·m (1.1 kgf·m, 97 in·lb)



- Apply thin coat of grease to the oil seal [A].
- Replace the O-ring [B] with a new one.



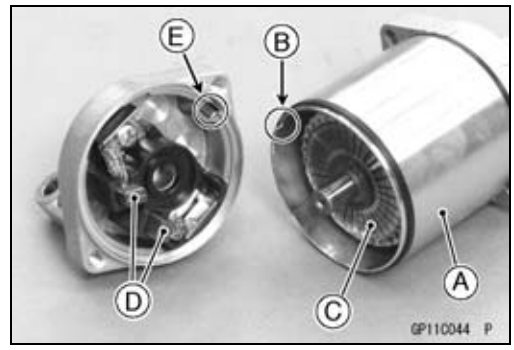
- Replace the seal rings [A] with new ones.

○Wrap the pinion gear portion with the vinyl tape to prevent the oil seal from damaging during installation.

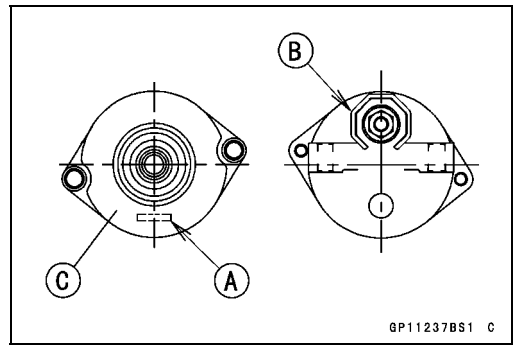
- Insert the armature [B] into the left end cover [C].

Electric Starter System

- Install the yoke [A] over the armature so that the cut-out [B] on the yoke faces commutator side [C].
- Make sure the brush springs and brushes [D] are installed in place.
- Align the tab [E] with the cut-out on the yoke to install the right end cover to the yoke.



- Make sure the stamped mark [A] and terminal [B] are properly positioned as shown.
- Turn the left end cover [C] if necessary.



- Tighten:

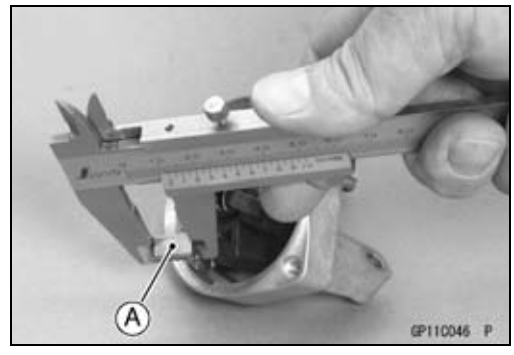
Torque - Starter Motor Through Bolts [A]: 5.0 N·m (0.51 kgf·m, 44 in·lb)

Brush Inspection

- Measure the length of each brush [A].

★If any is worn down to the service limit, replace the brush assy.

Starter Motor Brush Length
Standard: 12 mm (0.47 in.)
Service Limit: 6.5 mm (0.26 in.)



Commutator Cleaning and Inspection

- Clean the metallic debris off the between commutator segments [A].

NOTE

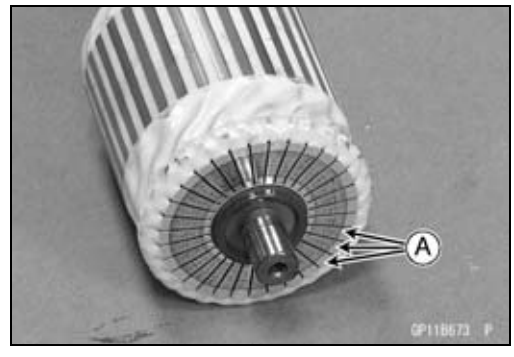
○*Do not use emery or sand paper on the commutator.*

- Check the commutator for damage or abnormal wear.

★Replace the starter motor with a new one if there is any damage or wear.

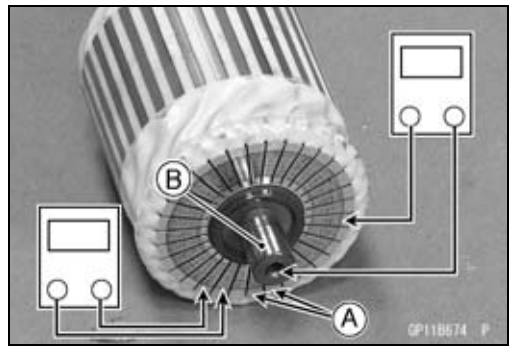
- Visually inspect the commutator segments for discoloration.

★Replace the starter motor with a new one if discoloration is noticed.



Electric Starter System

Armature Inspection



- Using the × 1 Ω hand tester range, measure the resistance between any two commutator segments [A].

Special Tool - Hand Tester: 57001-1394

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

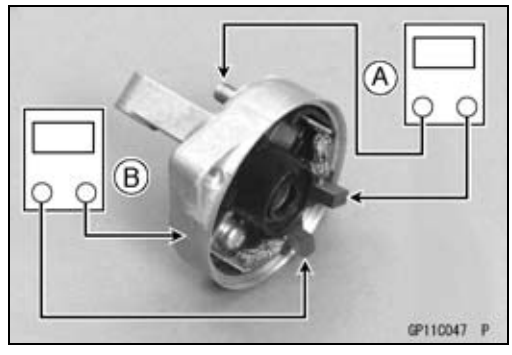
- Using the highest hand tester range, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

Brush Lead Inspection

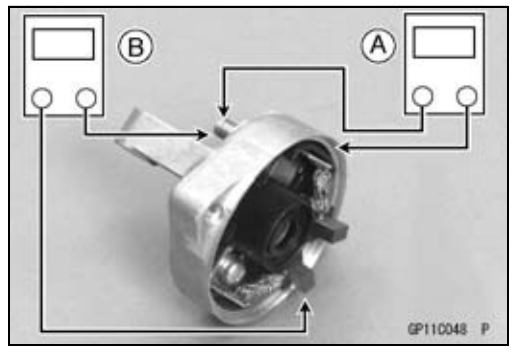


- Using the × 1 Ω hand tester range, measure the resistance as shown.
  Terminal Bolt and Positive Brushes [A]
  End Cover and Negative Brushes [B]

Special Tool - Hand Tester: 57001-1394

★If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assy.

End Cover Inspection

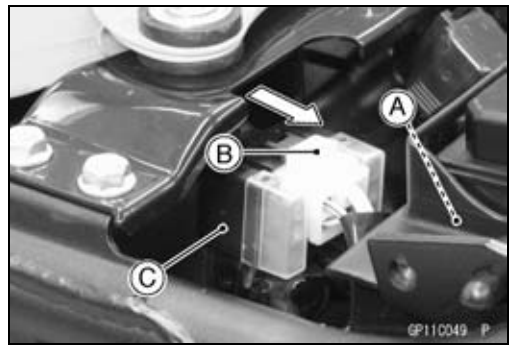


- Using the highest hand tester range, measure the resistance as shown.
  Terminal Bolt and End Cover [A]
  Terminal Bolt and Negative Brushes [B]

Special Tool - Hand Tester: 57001-1394

★If there is any reading, the brush assy and/or terminal bolt assy have a short. Replace the starter motor.

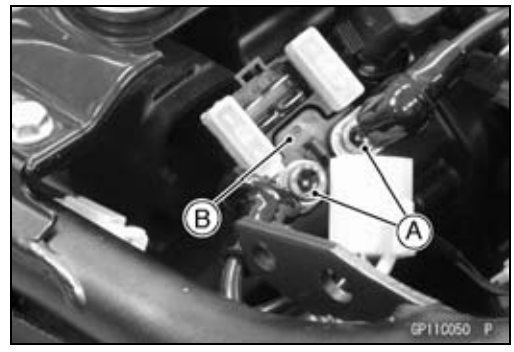
Starter Relay Inspection



- Remove:
  Battery [A] (see Battery Removal)
- Pull the starter relay rearward to remove it from the bracket.
- Disconnect the connector [B] from the starter relay [C].

Electric Starter System

● Remove:
Cable Terminal Bolts [A]
Starter Relay [B]



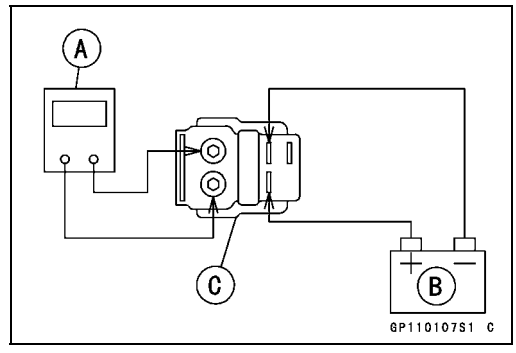
● Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown.

Special Tool - Hand Tester: 57001-1394

★If the relay does not work as specified, the relay is defective. Replace the relay.

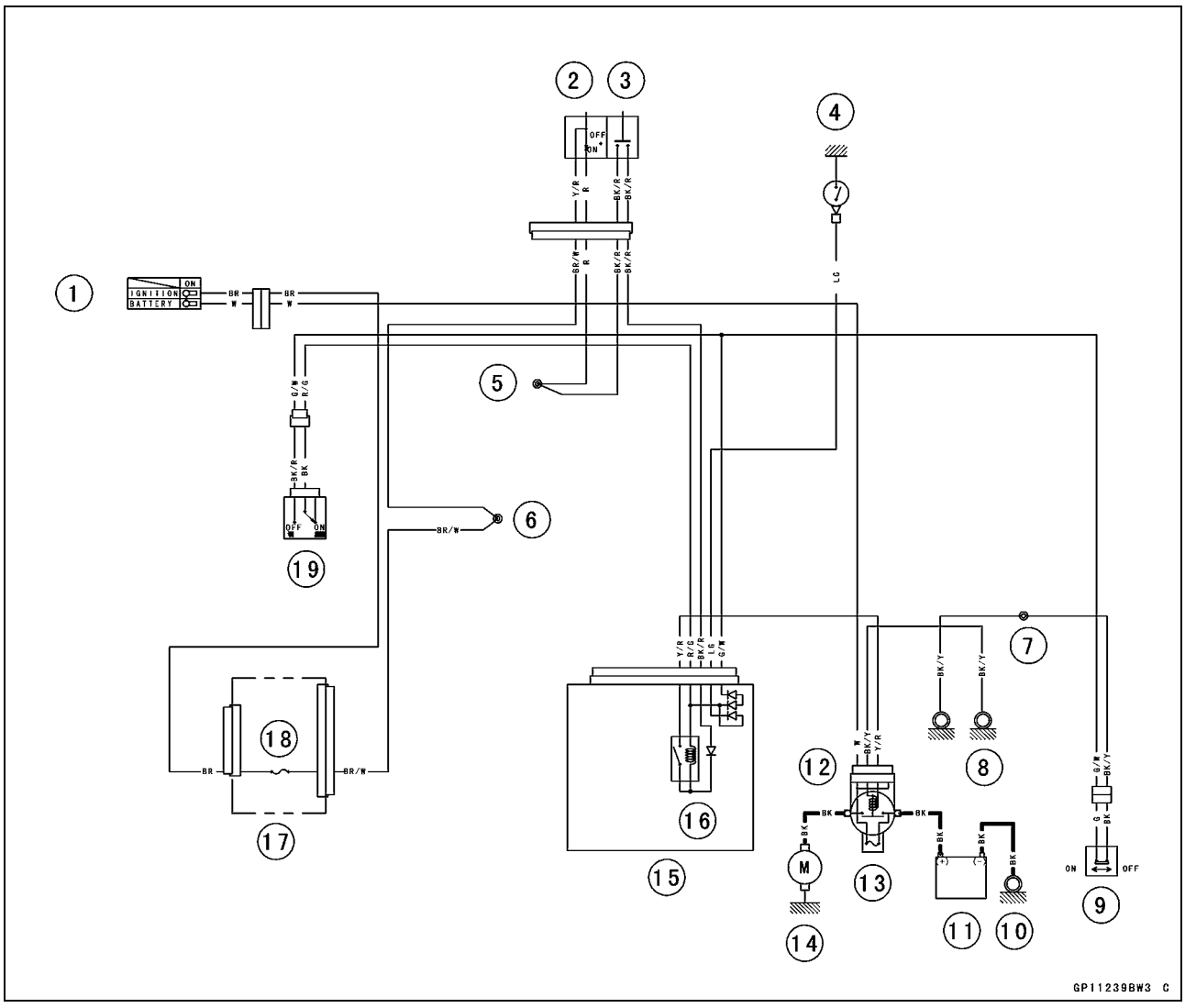
Testing Relay

Tester Range:	**× 1 Ω range**
Criteria:	**When battery is connected → 0 Ω**
	When battery is disconnected → ∞ Ω



Electric Starter System

Electric Starter Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Neutral Switch
5. Water-proof Joint 5
6. Water-proof Joint 7
7. Water-proof Joint 1
8. Frame Ground
9. Sidestand Switch
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Starter Motor
15. Relay Box
16. Starter Circuit Relay
17. Fuse Box 1
18. Ignition Fuse 10 A
19. Starter Lockout Switch

Lighting System

This motorcycle adopt the daylight system and have a headlight relay in the relay box. The headlight does not go on when the ignition switch and the engine stop switch are first turned on. The headlight comes on after the starter button is released and stays on until the ignition switch is turned off. The headlight will go out momentarily whenever the starter button is pressed and come back on when the button is released.

Headlight Beam Horizontal Adjustment

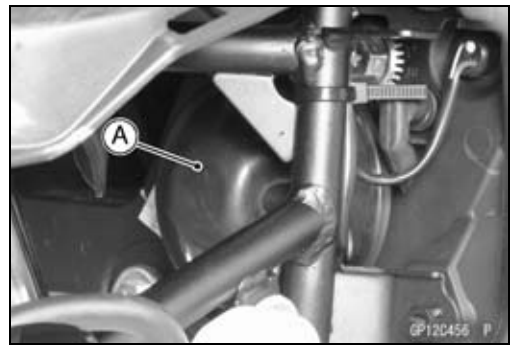
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Beam Vertical Adjustment

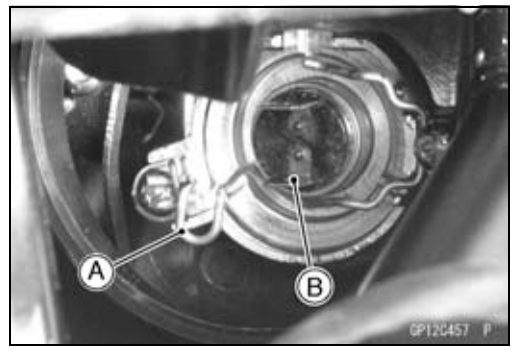
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Remove:
  Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Headlight Bulb Dust Cover [A]



- Remove:
  Hook [A]
  Headlight Bulb [B]



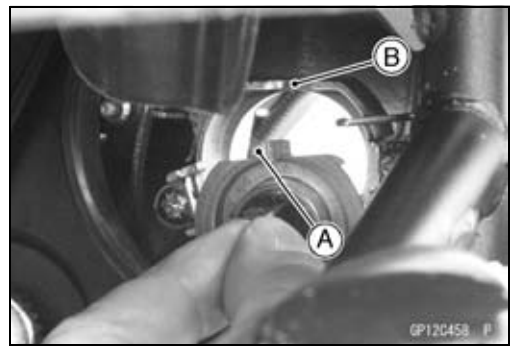
NOTICE

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

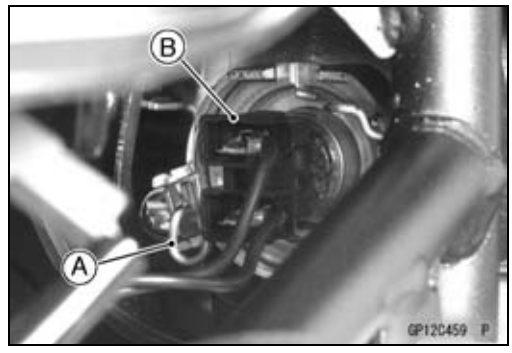
NOTE

○*Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

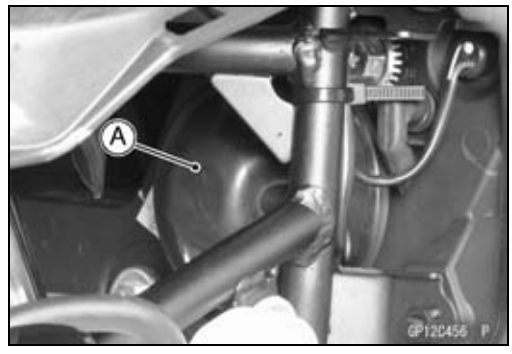
- Replace the headlight bulb.
- Fit the projection [A] on the bulb in the cutout [B] on the headlight.



- Install the hook [A] and connect the connector [B] to the headlight bulb.

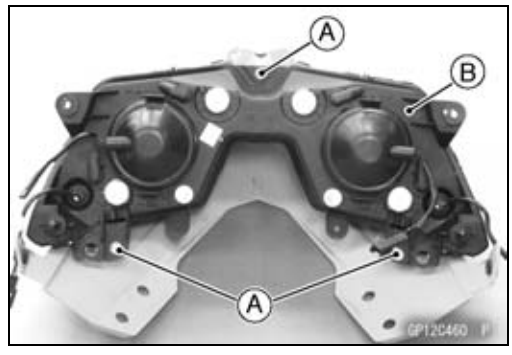


- Fit the dust cover [A] onto the headlight housing with its lead toward downward.
- After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).



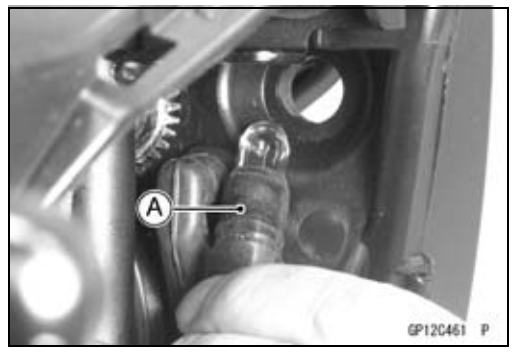
Headlight Removal/Installation

- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
  Bolts [A]
  Headlight [B]
- Installation is the reverse of removal.



City Light Bulb Replacement

- Remove the middle fairing (see Middle Fairing Removal in the Frame chapter).
- Pull out the socket [A] from the headlight housing.

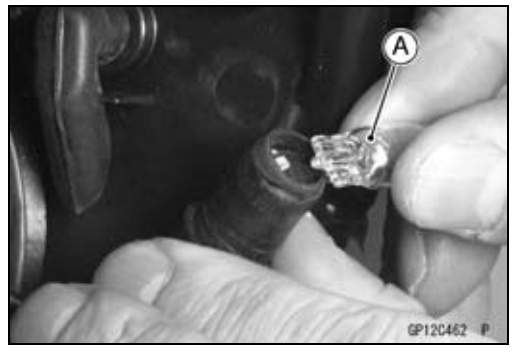


- Pull out the bulb [A] straight from the socket.

NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified value.

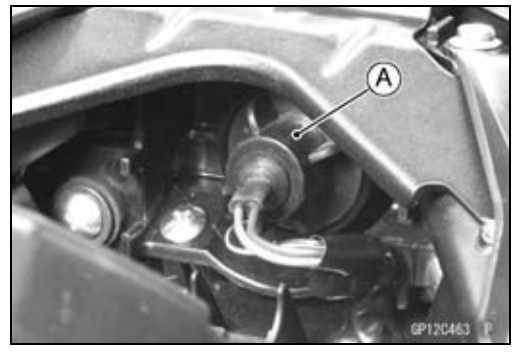
- Replace the bulb with a new one.



Lighting System

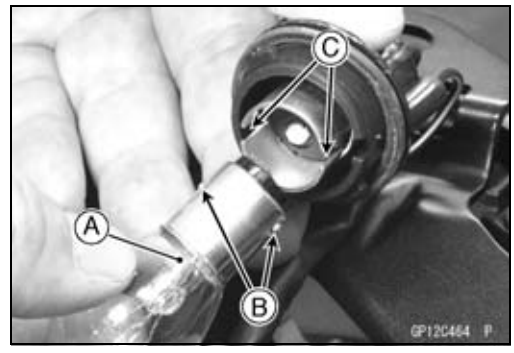
Tail/Brake Light Bulb Replacement

- Remove the rear seat (see Rear Seat Removal in the Frame chapter).
- Turn the socket [A] counterclockwise to remove it.



- Push the bulb [A] in the socket, turn it counterclockwise and pull it out.
- Insert the new bulb by aligning its pins [B] with the grooves [C] in the socket, and turn the bulb clockwise.

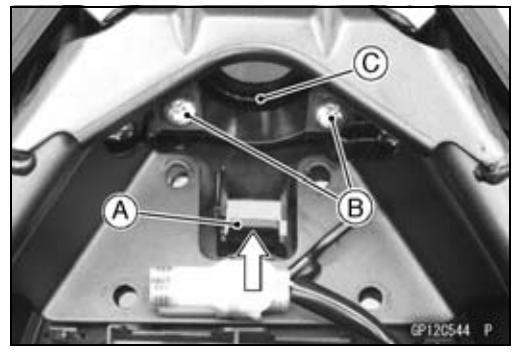
○Turn the bulb about 15°.



- Fit the projection [A] of the socket into the groove [B] of the tail/brake light.
- Turn the socket clockwise.

Tail/Brake Light Removal

- Remove:
  Seat Covers (see Seat Cover Removal in the Frame chapter)
  Flap Assembly (see Flap and Rear Fender Removal in the Frame chapter)
  Tail/Brake Light Socket (see Tail/Brake Light Bulb Replacement)
- Push the tab [A] to unhook the rear fender from the frame.
- Remove the tail/brake light mounting screws [B] while pulling down the rear of the fender.
- Remove the tail/brake light [C].

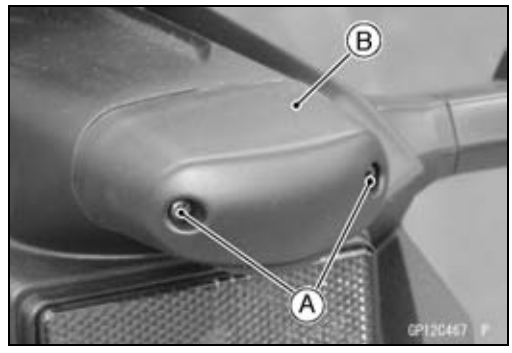


Tail/Brake Light Installation

- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

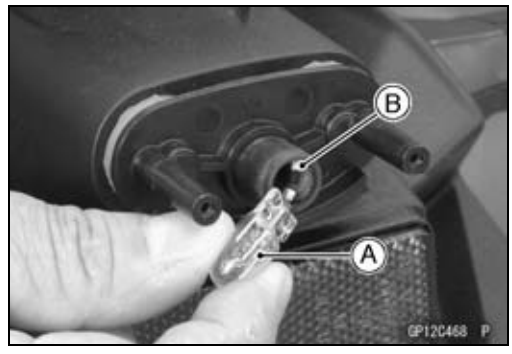
Lighting System

License Plate Light Bulb Replacement



- Remove:
  Screws [A]
  License Plate Light Cover [B]

- Pull the bulb [A] out of the socket [B].



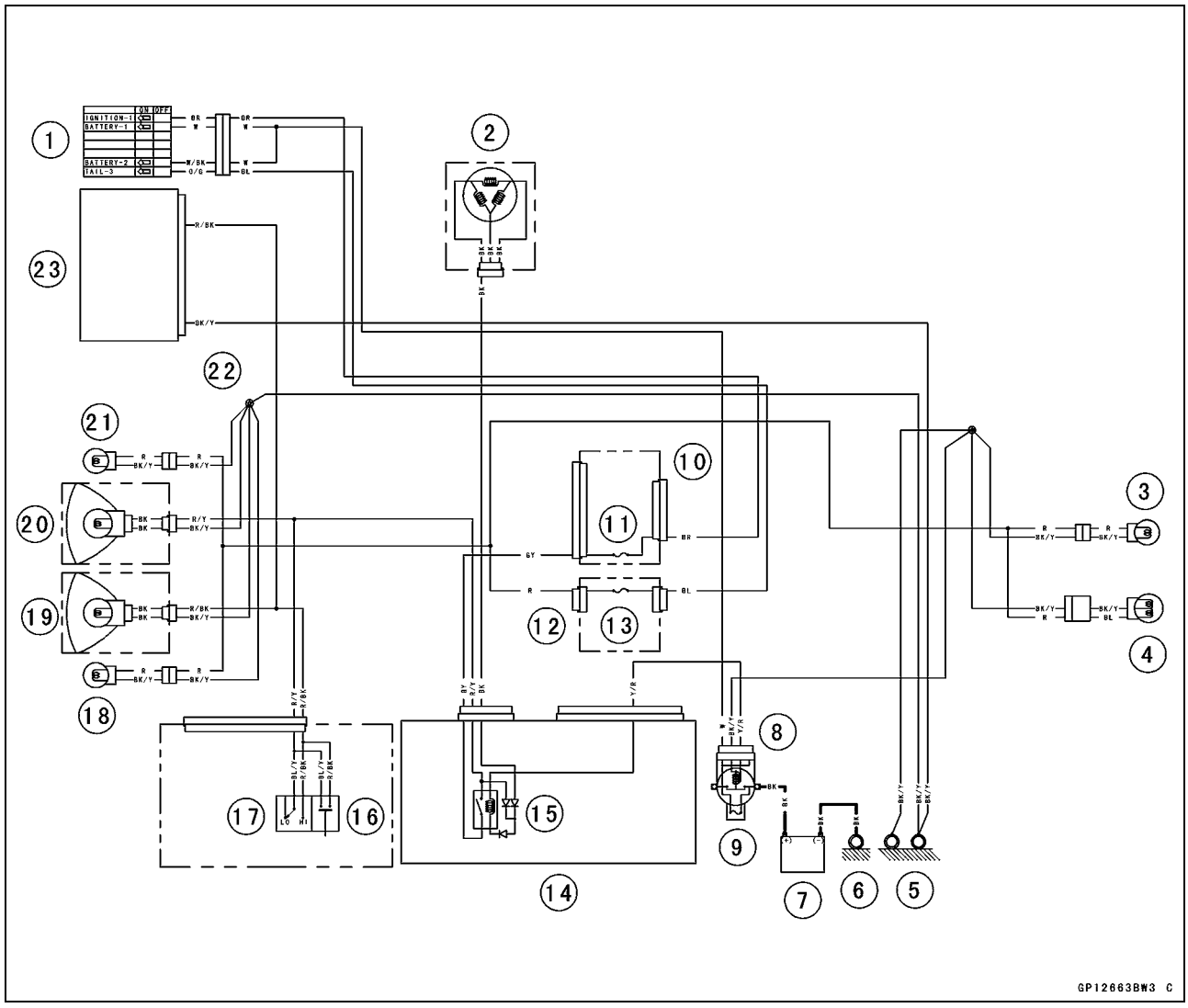
NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified valve.

- Replace the bulb with a new one.
- Insert the bulb into the socket.
- Install the license plate light cover.

Lighting System

Headlight/Tail Light Circuit



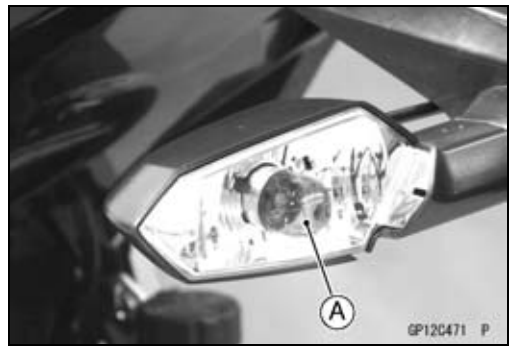
1. Ignition Switch
2. Alternator
3. License Plate Light 12 V 5 W
4. Tail/Brake Light 12 V 21/5 W
5. Frame Ground
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 1
11. Headlight Fuse 15 A
12. Fuse Box 2
13. Turn Signal Relay Fuse 10 A
14. Relay Box
15. Headlight Circuit Relay
16. Passing Button
17. Dimmer Switch
18. Left City Light 12 V 5 W
19. Headlight (High Beam) 12 V 55 W
20. Headlight (Low Beam) 12 V 55 W
21. Right City Light 12 V 5 W
22. Water-proof Joint 8
23. Meter Unit

Turn Signal Light Bulb Replacement

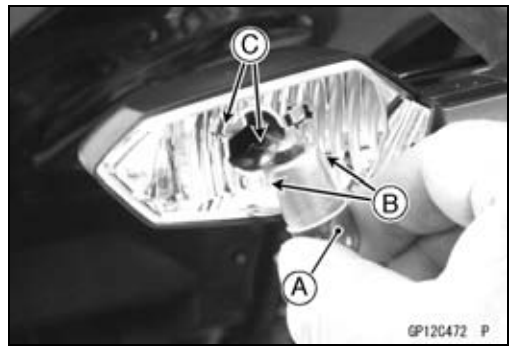
- Remove the screw [A] and lens [B].

Lighting System

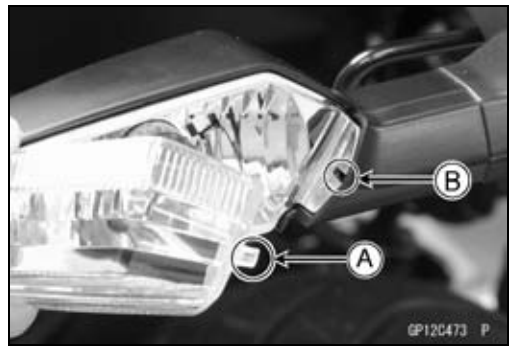
● Push and turn the bulb [A] counterclockwise and remove it.



● Insert the new bulb [A] by aligning its pins [B] with the grooves [C] in the socket, and turn the bulb clockwise.
○Turn the bulb about 15°.

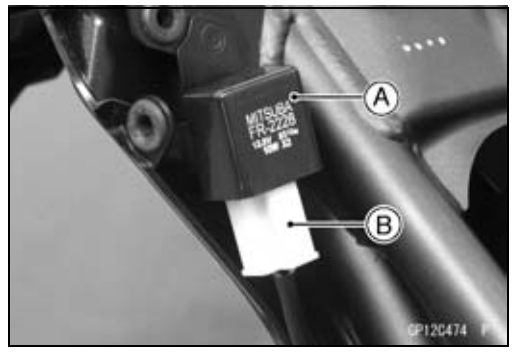


● Fit the projection [A] on the lens to the groove [B] on the socket.
● Tighten the screw.



Turn Signal Relay Inspection

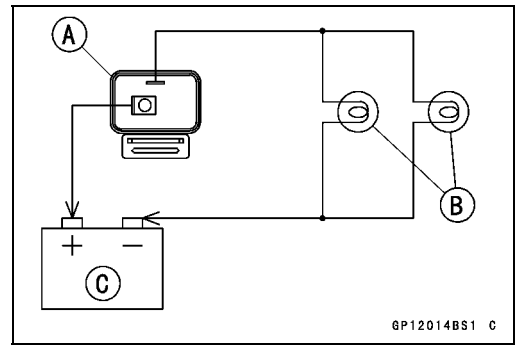
● Remove:
Left Seat Cover (see Seat Cover Removal in the Frame chapter)
Turn Signal Relay [A]
● Disconnect:
Connector [B]



Lighting System

- Connect one 12 V battery and turn signal lights as indicated in the figure, and count how may times the lights flash for one minute.
  Turn Signal Relay [A]
  Turn Signal Lights [B]
  12 V Battery [C]

★If the lights do not flash as specified, replace the turn signal relay.



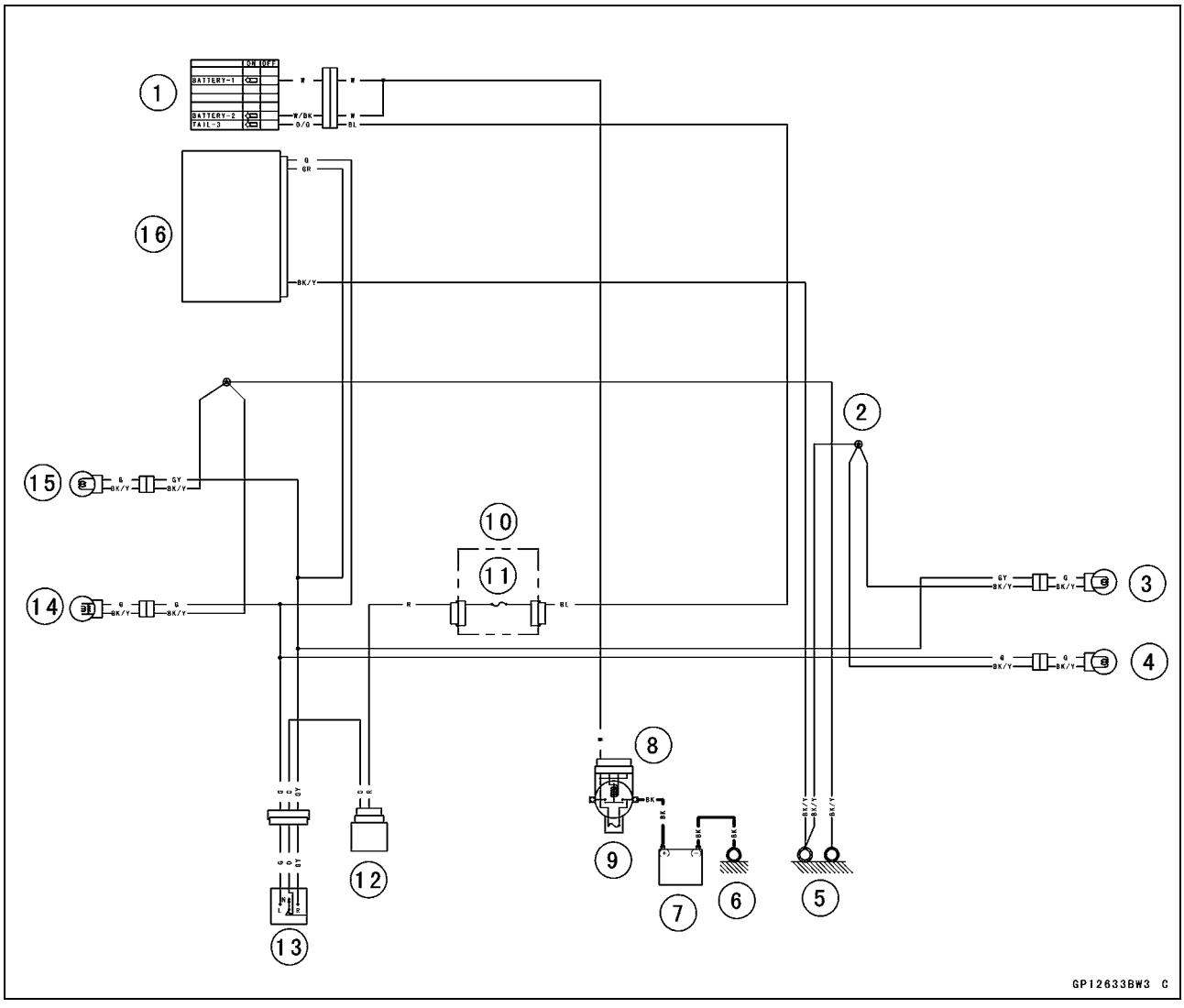
Testing Turn Signal Relay

Load		Flashing Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	Lights stays on
2	20	75 ~ 95

(*): Cycle(s) per minute
(**): Corrected to "one light burned out".

Lighting System

Turn Signal Light Circuit



1. Ignition Switch
2. Water-proof Joint 1
3. Rear Right Turn Signal Light 12 V 10 W
4. Rear Left Turn Signal Light 12 V 10 W
5. Frame Ground
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 2
11. Turn Signal Relay Fuse 10 A
12. Turn Signal Relay
13. Turn Signal Switch
14. Front Left Turn Signal Light 12 V 10 W
15. Front Right Turn Signal Light 12 V 10 W
16. Meter Unit

Air Switching Valve

Air Switching Valve Operation Test

● Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

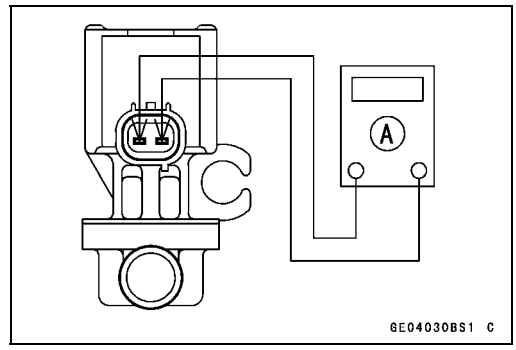
Air Switching Valve Unit Test

● Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).

● Set the hand tester [A] to the × 1 Ω range and connect it to the air switching valve terminals as shown in the figure.

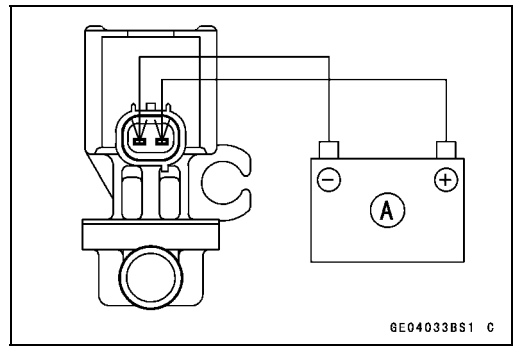
Special Tool - Hand Tester: 57001-1394

Air Switching Valve Resistance
Standard: 20 ~ 24 Ω at 20°C (68°F)

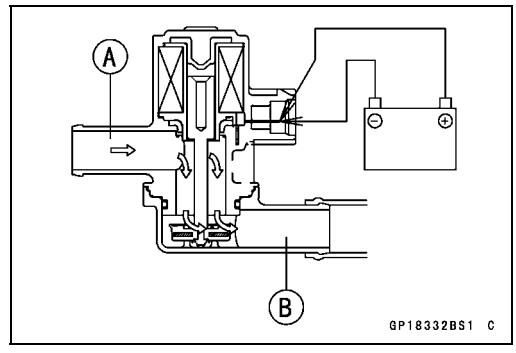


★If the tester does not read as specified value, replace it with a new one.

● Connect the 12 V battery [A] to the air switching valve terminals as shown in the figure.



● Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air duct [B].



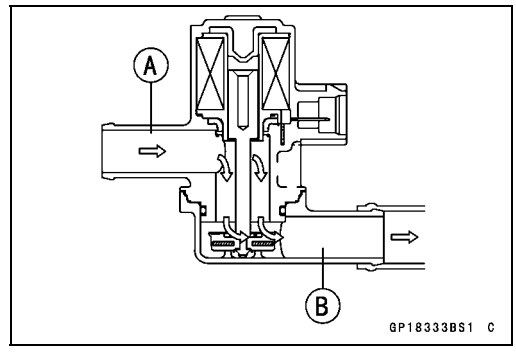
● Disconnect the 12 V battery.

● Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air duct [B].

★If the air switching valve does not operate as described, replace it with a new one.

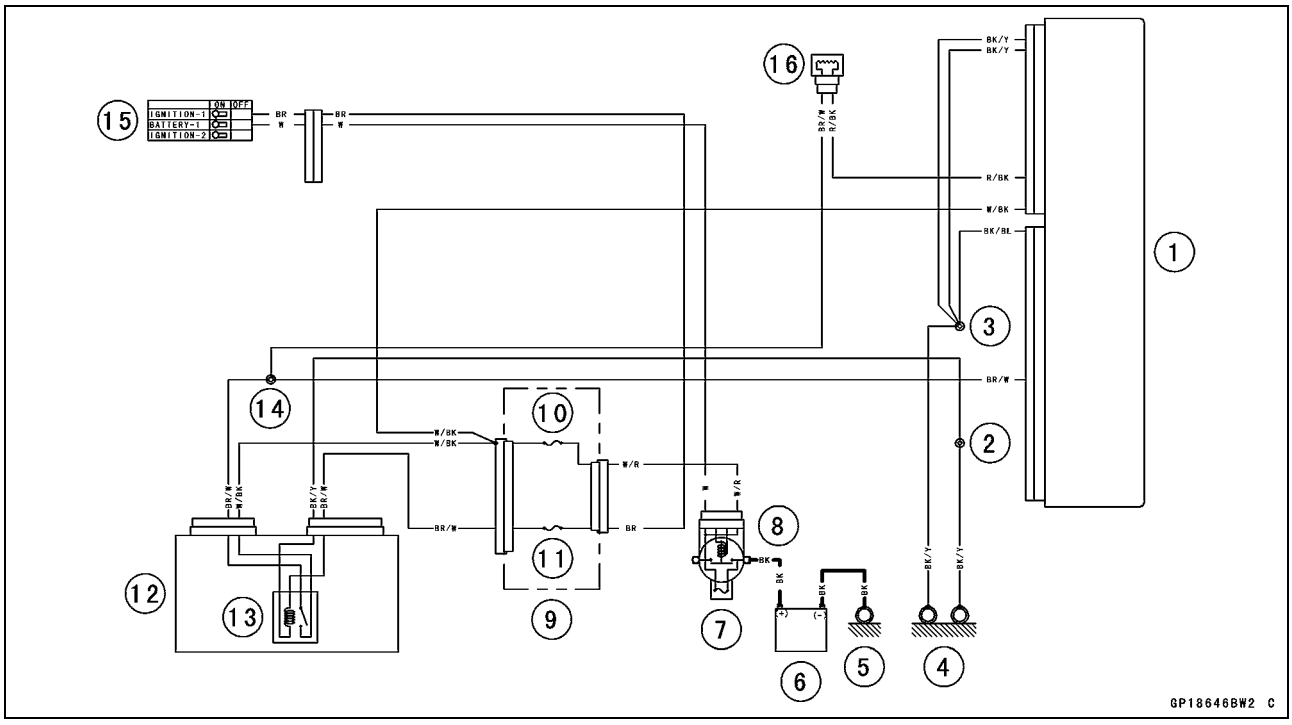
NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side).*



Air Switching Valve

Air Switching Valve Circuit



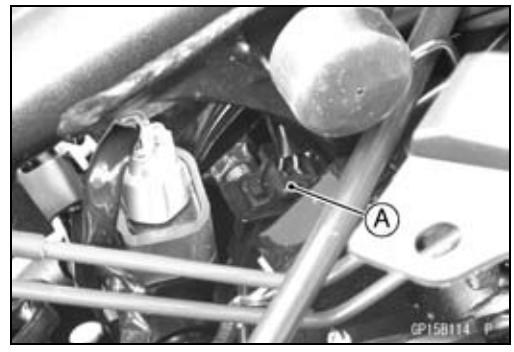
1. ECU
2. Water-proof Joint 1
3. Water-proof Joint 2
4. Frame Ground
5. Engine Ground
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Starter Relay
9. Fuse Box 1
10. FI Fuse 15 A
11. Ignition Fuse 10 A
12. Relay Box
13. ECU Main Relay
14. Water-proof Joint 8
15. Ignition Switch
16. Air Switching Valve

Radiator Fan System

Fan Motor Inspection

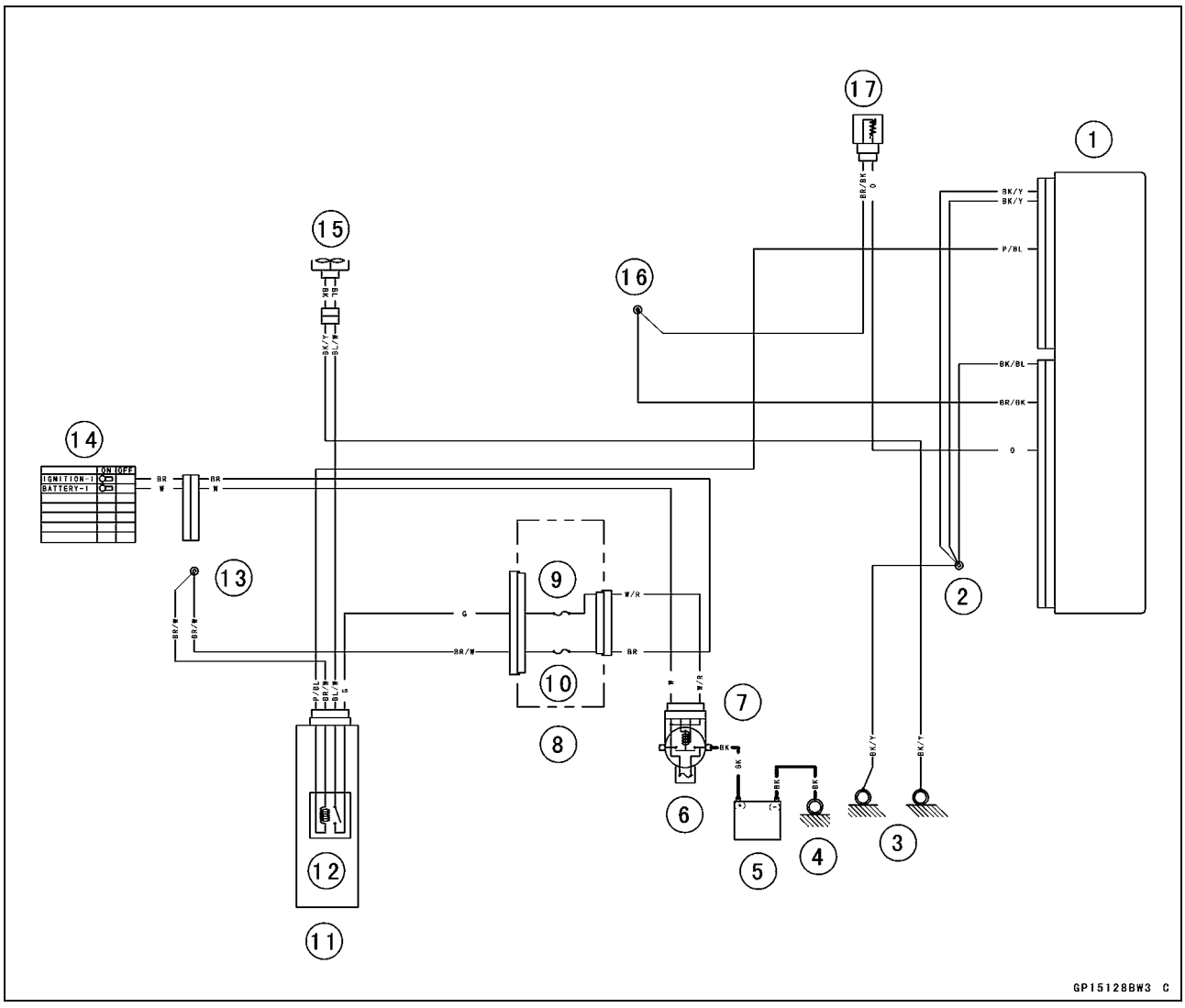
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.



Radiator Fan System

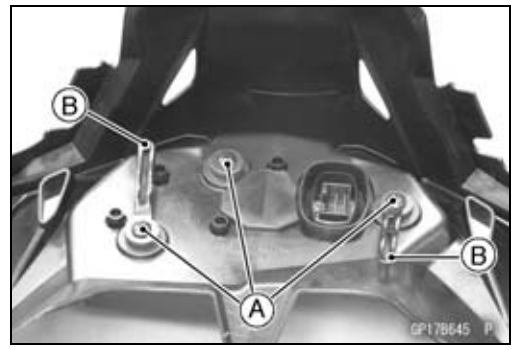
Radiator Fan Circuit



1. ECU
2. Joint Connector 2
3. Frame Ground
4. Engine Ground
5. Battery 12 V 8 Ah
6. Main Fuse 30 A
7. Starter Relay
8. Fuse Box 1
9. Fan Fuse 10 A
10. Ignition Fuse 10 A
11. Relay Box
12. Fan Relay
13. Water-proof Joint 7
14. Ignition Switch
15. Fan Motor
16. Water-proof Joint 3
17. Water Temperature Sensor

Meter, Gauge, Indicator Unit

Meter Unit Removal/Installation



- Remove:
  Instrument Cover (see Instrument Cover Removal in the Frame chapter)
  Screws [A]
  Clamps [B]

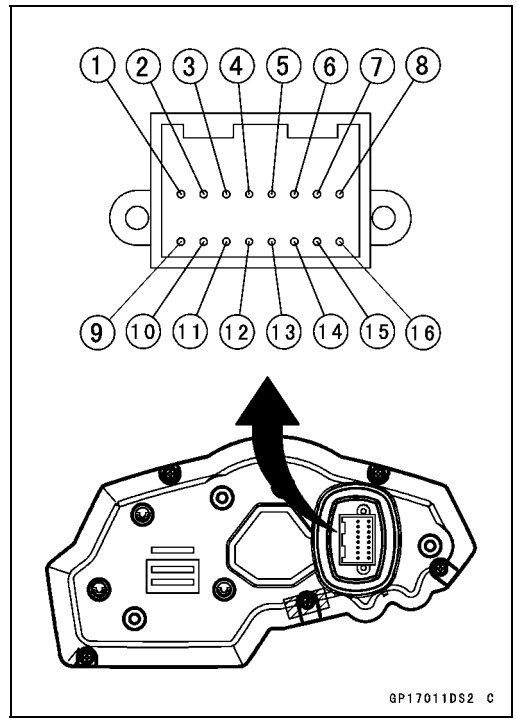
NOTICE

Place the meter unit so that the face is up. If a meter unit is left upside down or sideways for any length of time, it will malfunction.

○Do not try to disassemble the meter unit.

- Installation is the reverse of removal.
- Run the leads and cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Meter Unit Inspection



- Remove the meter unit (see Meter Unit Removal).
  [1] Green Left Turn Signal Indicator Light (LED)
  [2] Green Right Turn Signal Indicator Light (LED)
  [3] Green Neutral Indicator Light (LED) (–)
  [4] Blue High Beam Indicator Light (LED) (+)
  [5] Red Oil Pressure Warning Indicator Light (LED)
  [6] Battery (+)
  [7] Unused
  [8] Fuel Level Gauge
  [9] Yellow ABS Indicator Light (LED) (ABS Equipped Model only)
  [10] Yellow Engine Warning Indicator Light (LED)
  [11] Unused
  [12] Tachometer Signal
  [13] Unused
  [14] Speed Sensor Signal
  [15] Ground (–)
  [16] Ignition (+)

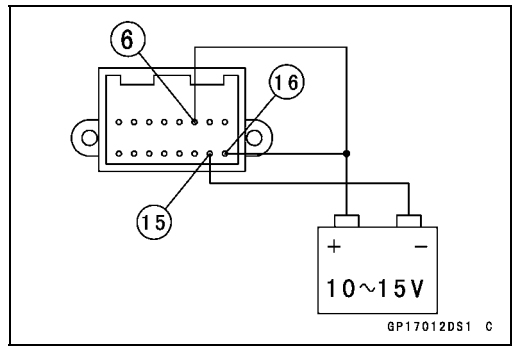
NOTICE

Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter unit is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminals.

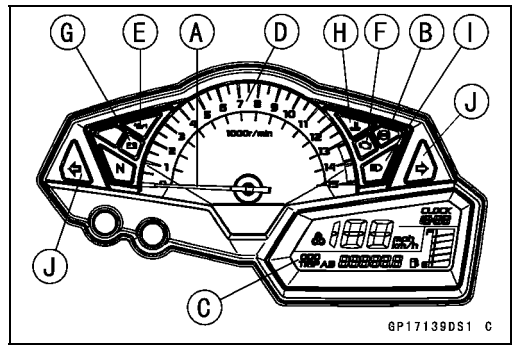
Meter, Gauge, Indicator Unit

Liquid Crystal Display (LCD) Segment Check

● Using the auxiliary leads, connect the 12 V battery to the meter unit connector as follows.
Battery Positive (+) Terminal to Terminal [6] and [16]
Battery Negative (–) Terminal to Terminal [15]



○Then the tachometer needle [A] sweeps to the maximum reading, then sweeps back to the minimum reading.
○The following should appear.
Yellow ABS Indicator Light (LED) [B] (ABS Equipped Model only)
LCD Segments [C]
LED Illumination Light [D]
○The following should appear for 2 seconds.
Red Oil Pressure Warning Indicator Light (LED) [E]
Yellow Engine Warning Indicator Light (LED) [F]
Red Battery Voltage Warning Indicator Light (LED) [G]
Red Water Temperature Warning Indicator Light (LED) [H]
Blue High Beam Indicator Light (LED) [I]
Green Turn Signal Indicator Lights (LED) [J]
○The all segments of the fuel gauge in the display will blink. (This function is Fuel Level Sensor Line Self-Diagnosis Mode. Refer to Fuel Level Sensor Line Self-Diagnosis Mode Inspection.)
★If the multifunction meter does not work as above, replace the meter assembly.
● Disconnect the terminal [16].
○The LED illumination light, LCD segments and all the warning indicator lights should disappear.
★If the multifunction meter does not work as above, replace the meter assembly.

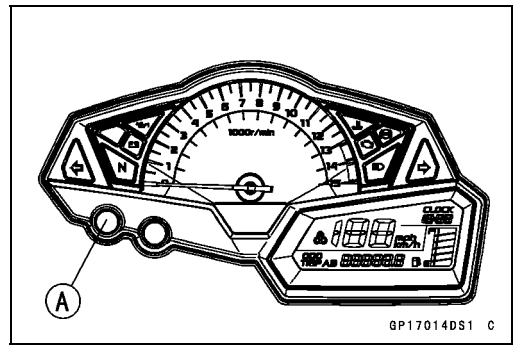


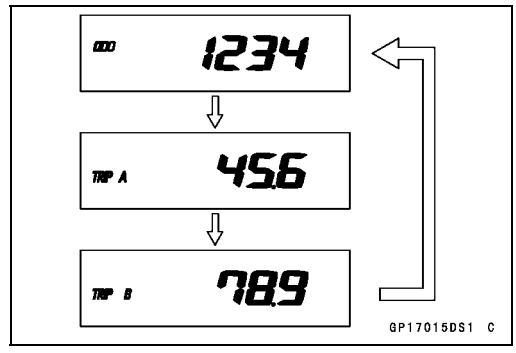
Meter, Gauge, Indicator Unit

Left and Right Button Operation Check

- Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
- Check that the multifunction meter displays shift as shown when the left button [A] is pressed.

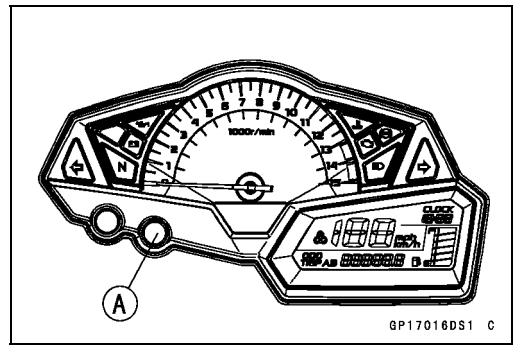
★If the multifunction meter display function does not work, replace the meter assembly.





- Display the odometer.
- Check that when the right button [A] is pressed for more than 2 seconds in ODO mode, the multifunction meter display turns to the clock set mode.

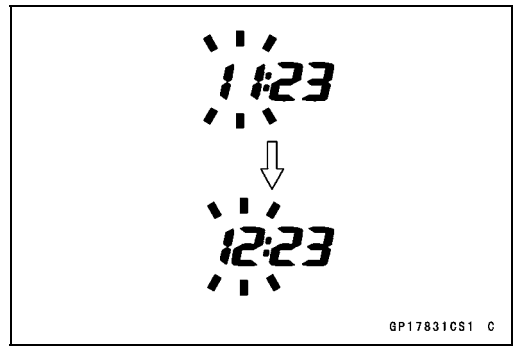
○Both the hour and minute display start blinking.



- In the HOUR/MINUTE setting mode, press the right button again to effect the HOUR setting mode.

○The hour display blinks on the display.

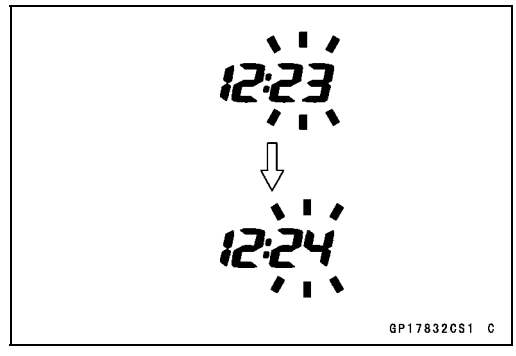
- Press the left button to set the hour.



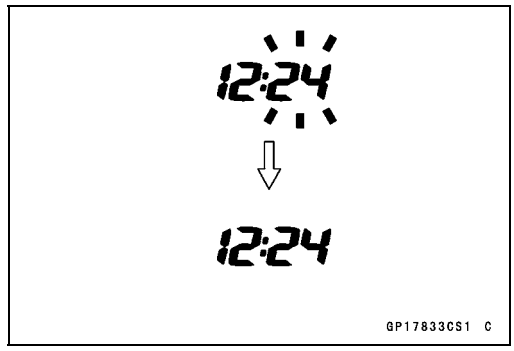
- In the HOUR setting mode, press the right button to effect the MINUTE setting mode.

○The minute display blinks on the display.

- Press the left button to set the minute.



● In the MINUTE setting mode, press the right button to return the HOUR/MINUTE setting mode.
● Press the left button to complete the clock setting process.
○The clock starts counting the seconds as soon as the left button is pressed.

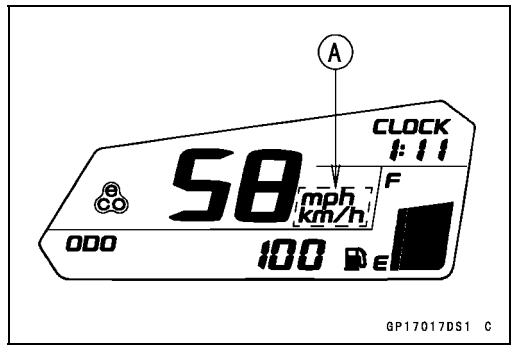


● Display the odometer.
● Check that the multifunction meter displays shift as shown by pressing the right button while the left button pressed in.

NOTE

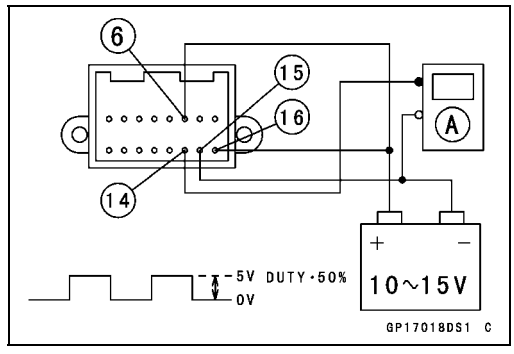
○*Km/h, mph display can alternate between English and metric modes (mile and km) [A] in the digital meter. Make sure that km/h or mph according to local regulations is correctly displayed before riding.*

★If the multifunction meter display function does not work, replace the meter assembly.



Speedometer Check

● Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
● The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave (illustrated as shown) would be input into the terminal [14].
○Indicates approximately 60 mph in case the input frequency would be approximately 166.9 Hz.
○Indicates approximately 60 km/h in case the input frequency would be approximately 104.3 Hz.
★If the oscillator is not available, the speedometer can be checked as follows.
○Install the meter unit (see Meter Unit Installation).
○Raise the rear wheel off the ground using the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
○Turn the ignition switch on.
○Rotate the rear wheel by hand.
○Check that the speedometer shows the speed.
★If the speedometer does not work, replace the meter assembly.



NOTE

○*The input frequency of the oscillator adds the integrated value of the odometer.*
○*The integrated value of the odometer cannot be reset.*

Meter, Gauge, Indicator Unit

Odometer Check

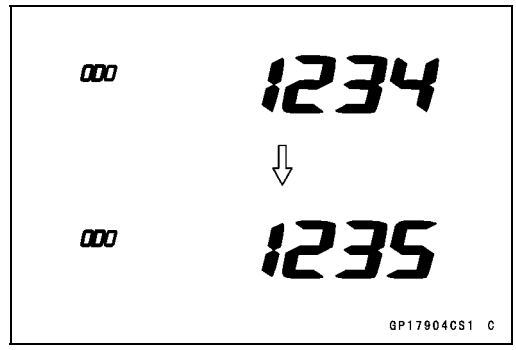
- Check the odometer with the speedometer in the same way.

★If the value indicated in the odometer is not added, replace the meter assembly.

NOTE

○*The integrated value of the odometer cannot be reset.*

○*When the figures come to 999999, they are stopped and locked.*



Trip Meter A/B Check

- Check the trip meter A/B with the speedometer in the same way.

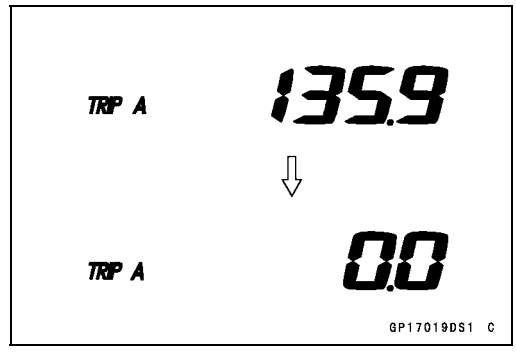
★If the value indicated in the trip meter A/B is not added, replace the meter assembly.

- Check that the figure display turns to 0.0 when the right button is pressed for more than 2 seconds.

★If the figure displayed in the trip meter A/B does not indicate 0.0, replace the meter assembly.

NOTE

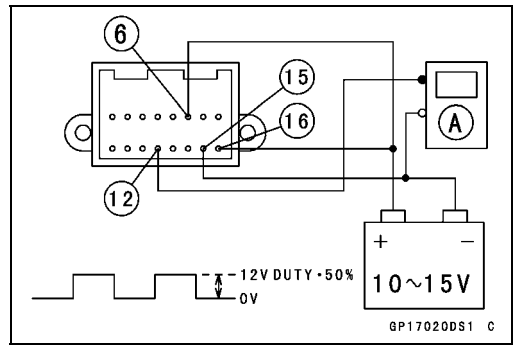
○*The integrated value of the odometer cannot be reset.*



Tachometer Check

- Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
- The revolutions per minute (rpm) equivalent to the input frequency is indicated in the oscillator [A] if the square wave (illustrated as shown) would be input into the terminal [12].

○Indicates approximately 4 000 rpm in case the input frequency would be approximately 133.3 Hz.

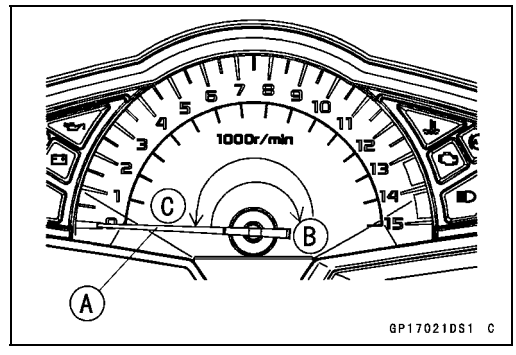


★If the oscillator is not available, the tachometer can be checked as follows.

○Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.

○Then the tachometer needle [A] sweeps to the maximum reading [B], then sweeps back to the minimum reading [C].

★If the tachometer needle does not sweep, replace the meter assembly.



○Using the insulated auxiliary lead, quickly open and connect the terminal [16] to the terminal [12] repeatedly.

○Then the tachometer needle should flick.

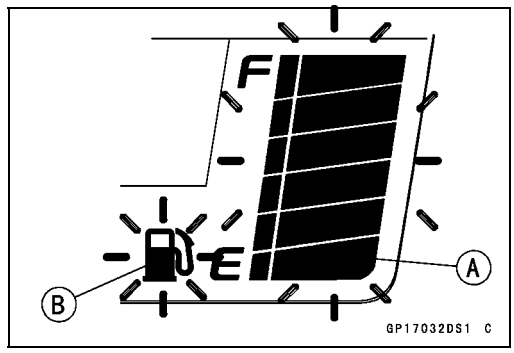
★If the tachometer needle does not flick, replace the meter assembly.

Meter, Gauge, Indicator Unit

Fuel Level Sensor Line Self-Diagnosis Mode Inspection

NOTE

○*Usually when the open or short of the fuel level sensor circuit is detected, it becomes the Fuel Level Sensor Line Self-Diagnosis Mode.*



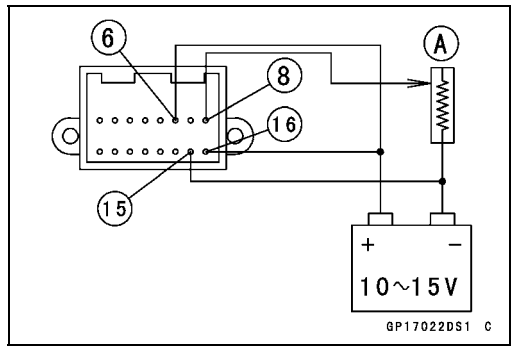
○The all segments of the fuel gauge [A] and fuel warning symbol [B] in the display will blink. (This function is Fuel Level Sensor Line Self-Diagnosis Mode.)

★If the meter enters the self-diagnostic mode when the meter is installed in the motorcycle, check the fuel level sensor (see Fuel Level Sensor Inspection).

★If the fuel level sensor and wiring are good, replace the meter unit.

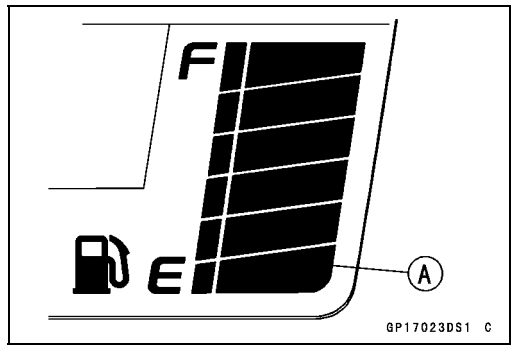
Fuel Level Gauge Check

- Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
- Connect the variable rheostat [A] between the terminal [8] and ground.



- Check that the number of segments [A] matches the resistance value of the variable rheostat.

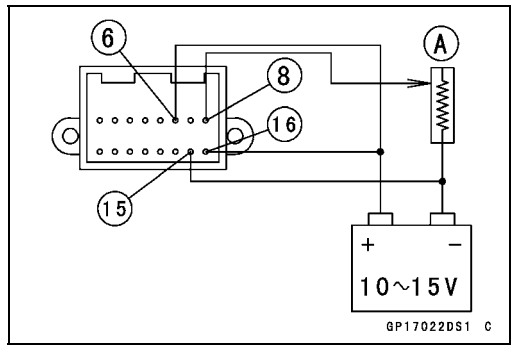
Variable Rheostat Resistance (Ω)	Display Segments
9.5 ~ 15.4	6
61.9 ~ 97.8	4
178.7 ~ 197.4	1



★If the multifunction meter display function does not work, replace the meter assembly.

Fuel Level Warning Check

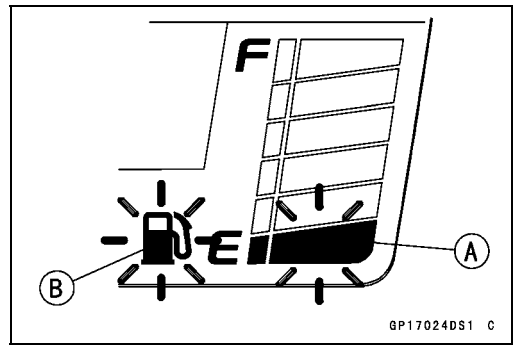
- Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
- Connect the variable rheostat [A] between the terminal [8] and ground.
- Adjust the resistance value to the approximately 216 Ω.



Meter, Gauge, Indicator Unit

- Check that one segment [A] in the fuel gauge starts blinking.
- Check that the fuel warning symbol [B] blinks.

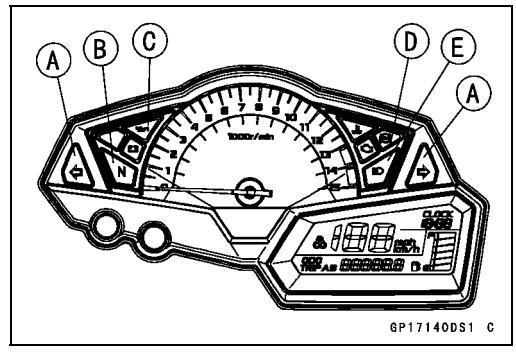
★If the multifunction meter display function does not work, replace the meter assembly.



Indicator Lights Inspection

- Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
- Check that the following lights go on.

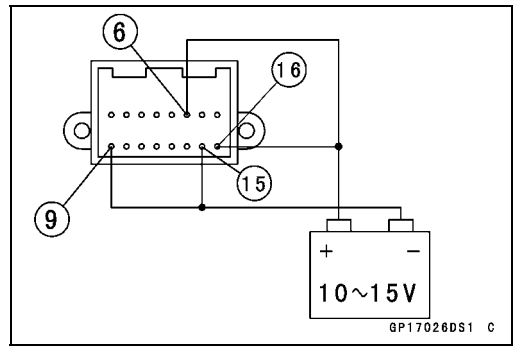
  Green Right and Left Turn Signal Indicator Lights (LED) [A]
  Green Neutral Indicator Light (LED) [B]
  Red Oil Pressure Warning Indicator Light (LED) [C]
  Yellow ABS Indicator Light (LED) [D] (ABS Equipped Model only)
  Blue High Beam Indicator Light (LED) [E]



- Using the auxiliary leads, connect a 12 V battery to the meter unit connector as follows.

Yellow ABS Indicator Light (LED) (ABS Equipped Model only)

Battery Negative (–) Terminal to Terminal [9]

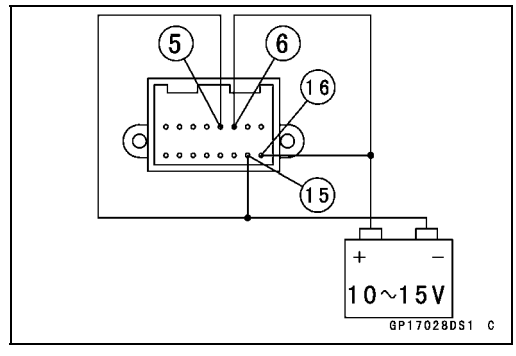


Red Oil Pressure Warning Indicator Light (LED)

Battery Negative (–) Terminal to Terminal [5]

NOTE

○*The red oil pressure warning indicator light (LED) should go on after about 3 seconds from connecting the terminals.*

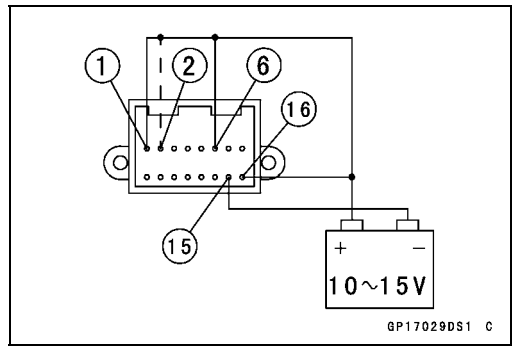


Meter, Gauge, Indicator Unit

Green Left and Right Turn Signal Indicator Light (LED)

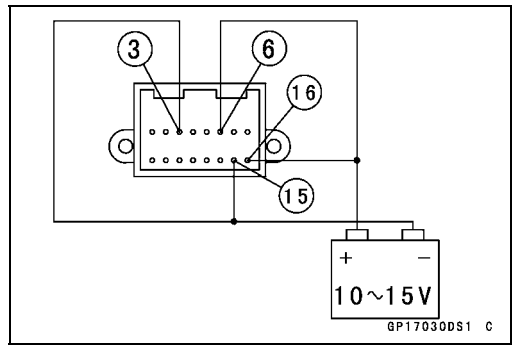
For Green Left Turn Signal Indicator Light (LED)
Battery Positive (+) Terminal to Terminal [1]

For Green Right Turn Signal Indicator Light (LED)
Battery Positive (+) Terminal to Terminal [2]



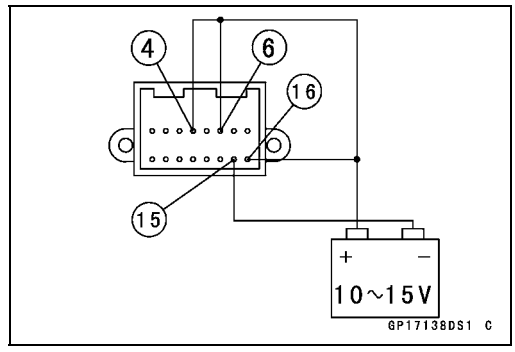
Green Neutral Indicator Light (LED)

Battery Negative (–) Terminal to Terminal [3]



Blue High Beam Indicator Light (LED)

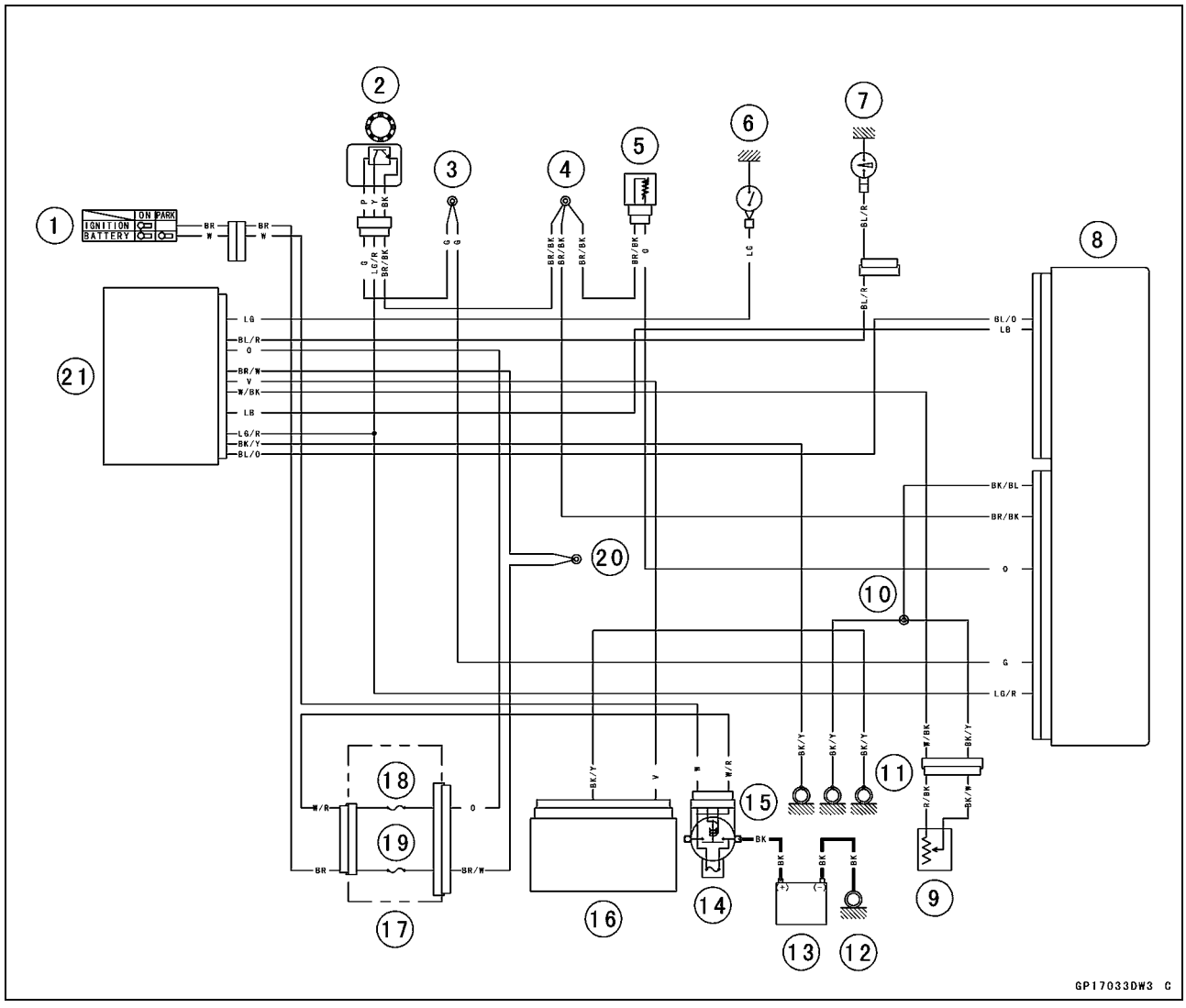
Battery Positive (+) Terminal to Terminal [4]



★If each light (LED) does not go on, replace the meter assembly.

Meter, Gauge, Indicator Unit

Meter Circuit



1. Ignition Switch
2. Speed Sensor
3. Water-proof Joint 4
4. Water-proof Joint 3
5. Water Temperature Sensor
6. Neutral Switch
7. Oil Pressure Switch
8. ECU
9. Fuel Level Gauge
10. Water-proof Joint 2
11. Frame Grounds
12. Engine Ground
13. Battery 12 V 8 Ah
14. Main Fuse 30 A
15. Starter Relay
16. ABS Hydraulic Unit (ABS Equipped Models)
17. Fuse Box 1
18. Meter Fuse 10 A
19. Ignition Fuse 10 A
20. Water-proof Joint 7
21. Meter Unit

Switches and Sensors

Brake Light Timing Inspection

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

● Using a hand tester, check to see that only the connections shown in the table have continuity.

○For the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.

★If the switch has an open or short, repair it or replace it with a new one.

Special Tool - Hand Tester: 57001-1394

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○———	———○
When brake pedal is released		

Sidestand Switch Connections

Sidestand Switch Connections		
Color	BK	G
When sidestand is down		
When sidestand is up	○———	———○

Neutral Switch Connections

Neutral Switch Connections		
Color	SW. Terminal	Ground
When transmission is in neutral	○———	———○
When transmission is not in neutral		

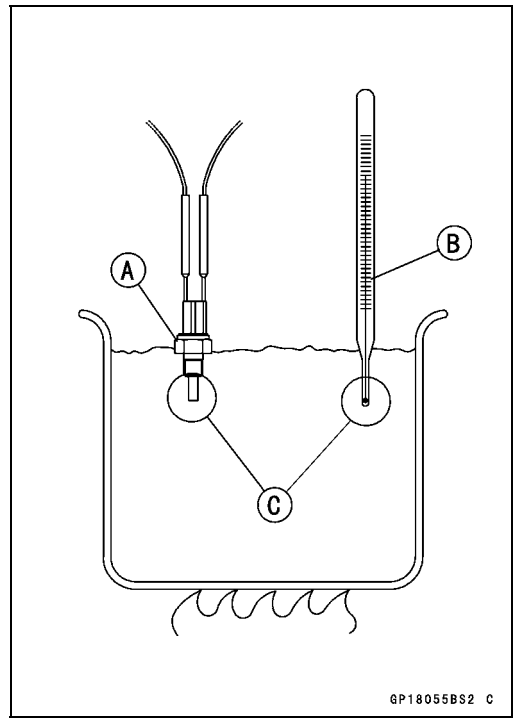
Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW. Terminal	Ground
When engine is stopped	○———	———○
When engine is running		

*: Engine lubrication system is in good condition.

Switches and Sensors

Water Temperature Sensor Inspection



- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter).
- Suspend the sensor [A] in a container of coolant so that the temperature-sensing projection [C] is submerged.
- Suspend an accurate thermometer [B] with temperature -sensing projection located in almost the same depth with the sensor.

NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the sensor.

★If the hand tester does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

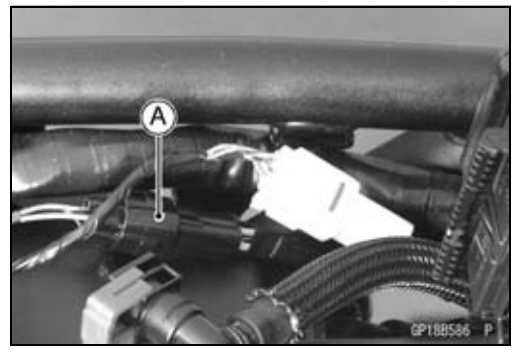
Temperature	Resistance (kΩ)
–20°C (–4°F)	*18.80 ±2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070

*: Reference Information

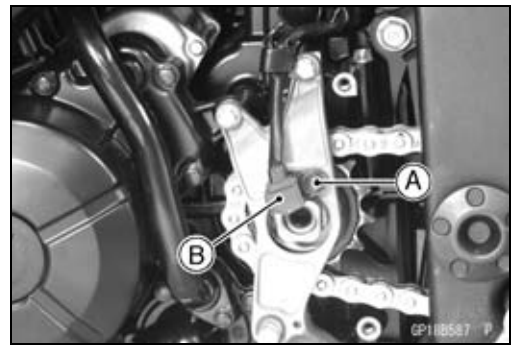
Speed Sensor Removal

NOTICE

Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.



- Lift up the fuel tank slightly (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].



- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Speed Sensor Bolt [A]
  Speed Sensor [B]

Switches and Sensors

Speed Sensor Installation

- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply a non-permanent locking agent to the threads of the speed sensor bolt, and tighten it.

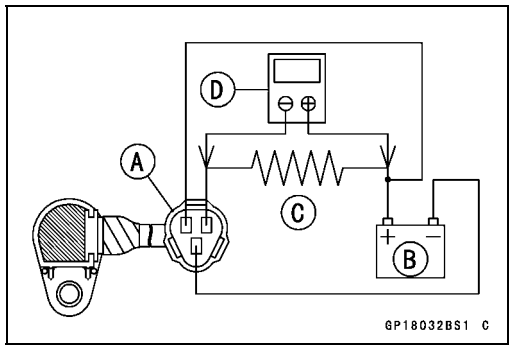
Torque - Speed Sensor Bolt: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- Install the removed parts (see appropriate chapters).

Speed Sensor Inspection

- Remove the speed sensor (see Speed Sensor Removal).
- Connect the speed sensor connector [A] with the battery [B], 10 kΩ resistor [C] and hand tester [D] as shown.
- Set the tester to the DC 25 V range.

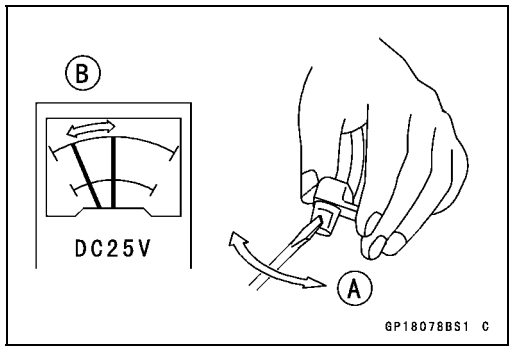
Special Tool - Hand Tester: 57001-1394



- Trace [A] each side of the speed sensor surface with the screwdriver.

○Then the tester indicator should flick [B].

★If the tester indicator does not flick, replace the speed sensor.



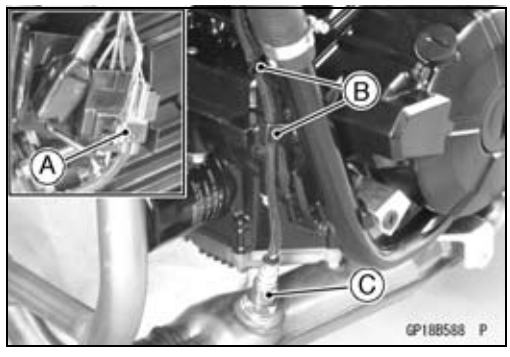
Oxygen Sensor Removal (Equipped Model)

NOTICE

Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.

NOTICE

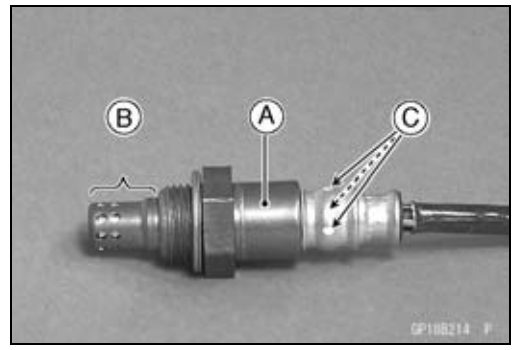
Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.



- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the oxygen sensor lead connector [A].
- Free the lead from the clamps [B].
- Remove the oxygen sensor [C].

Switches and Sensors

Oxygen Sensor Installation (Equipped Model)



NOTICE

Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] and filter holes [C] of the sensor to prevent oil contact. Oil contamination from hands can reduce sensor performance.

- Apply a silicone grease to the threads of the sensor, and install it to the exhaust pipe.
- Tighten:

Torque - Oxygen Sensor: 44.1 N·m (4.50 kgf·m, 32.5 ft·lb)

- Run the oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

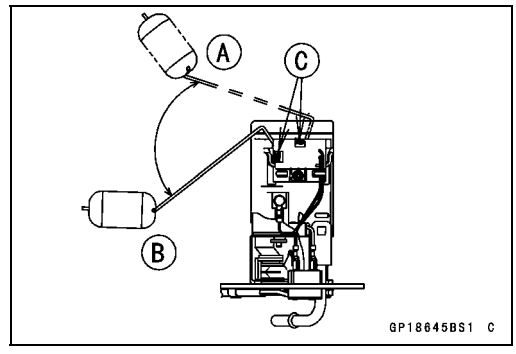
Oxygen Sensor Inspection (Equipped Model)

- Refer to the Oxygen Sensor Inspection in the Fuel System (DFI) chapter.

Fuel Level Sensor Inspection

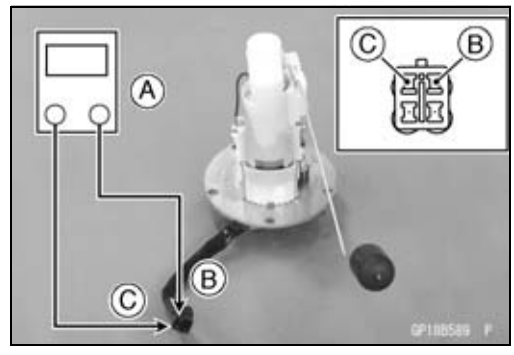
- Remove:
  Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly, replace the fuel pump.
  Float in Full Position [A]
  Float in Empty Position [B]
  Float Arm Stoppers [C]



- Using the hand tester [A], measure the resistance between the R/BK lead [B] and BK/W lead [C] terminals.

Special Tools - Hand Tester: 57001-1394



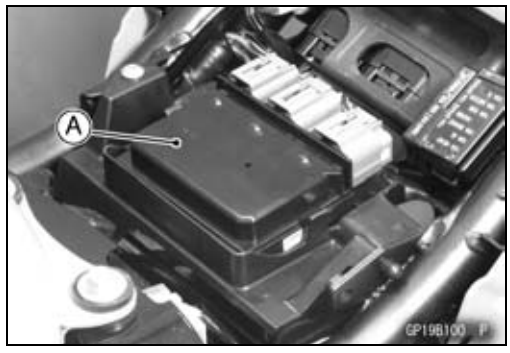
★If the tester readings are not as specified, or do not change smoothly according as the float moves up and down, replace the fuel pump.

Fuel Level Sensor Resistance
Standard: Full position: 9 ~ 11 Ω
Empty position: 213 ~ 219 Ω

Relay Box

NOTE

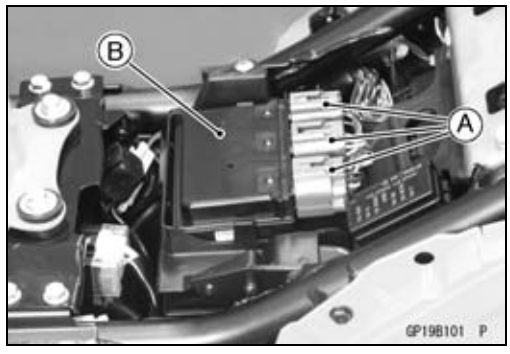
○*The relay box [A] has relays and diodes. The relays and diodes can not be removed.*



Relay Box Removal

NOTICE

Never drop the relay box especially on a hard surface. Such a shock to the relay box can damage it.



- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
- Disconnect the connectors [A] and remove the relay box [B].

Relay Box Installation

- Installation is the reverse of removal.

○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following numbered terminals by connecting the hand tester and one 12 V battery to the relay box as shown in the figure (see Relay Box Internal Circuit in this section).

★If the tester does not read as specified, replace the relay box.

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Circuit Relay	1-3	∞
ECU Main Relay	7-6	∞
	4-5	Not ∞*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞*
Starter Circuit Relay	11-16	∞
	11-12	∞
Fan Relay	17-20	∞
	18-19	Not ∞*

*: The actual reading varies with the hand tester used.

Relay Box

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
Headlight Circuit Relay	2-11	1-3	0
ECU Main Relay	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Tester Connection DC 25 V Range (+) (–)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.
(–): Apply negative lead.

Diode Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following pairs of terminals (see Relay Box Internal Circuit in this section).

Diode Circuit Inspection

Tester Connection	1-11, 2-11, 12-13, 12-15, 12-16, 13-14, 13-15

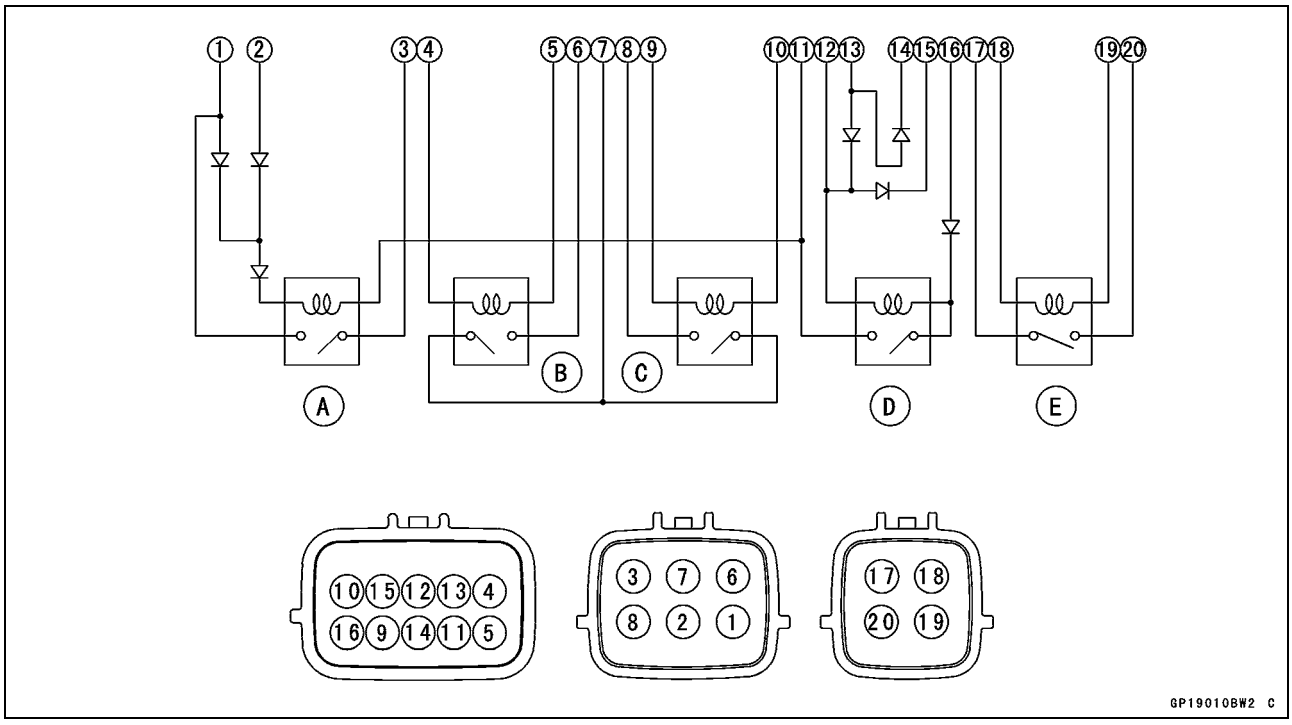
★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

NOTE

○*The actual meter reading varies with the meter or tester used and the individual diodes, but generally speaking, the lower reading should be from zero to one half the scale.*

Relay Box

Relay Box Internal Circuit

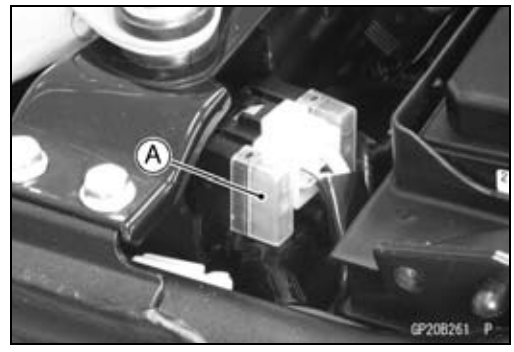


A: Headlight Circuit Relay
B: ECU Main Relay
C: Fuel Pump Relay
D: Starter Circuit Relay
E: Fan Relay

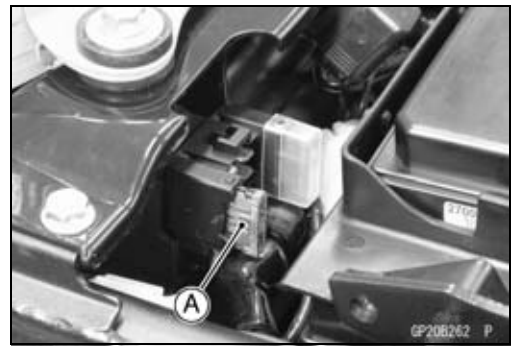
Fuse

30 A Main Fuse Removal

- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  30 A Main Fuse Cover [A]

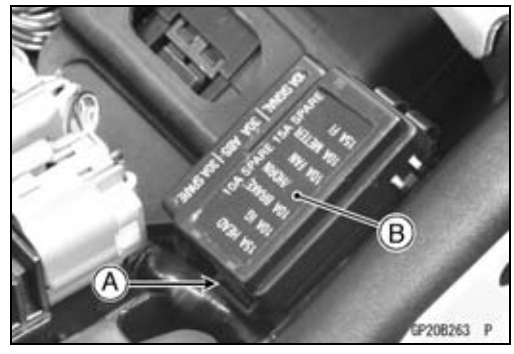


- Pull out the main fuse [A] from the starter relay with a needle nose pliers.



Fuse Box Fuse Removal

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Unlock the hook [A] to lift up the lid [B].



- Pull the sub fuses [A] straight out from the fuse box with a needle nose pliers.

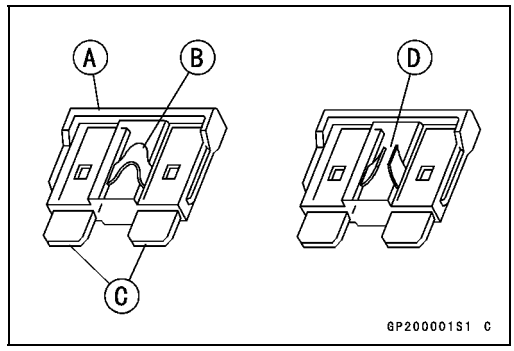
Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

- Install the fuse box fuses on the original position as specified on the lid.

Fuse

Fuse Inspection



- Remove the fuse (see 30 A Main/Fuse Box/Sub Fuse Removal).
- Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]

NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

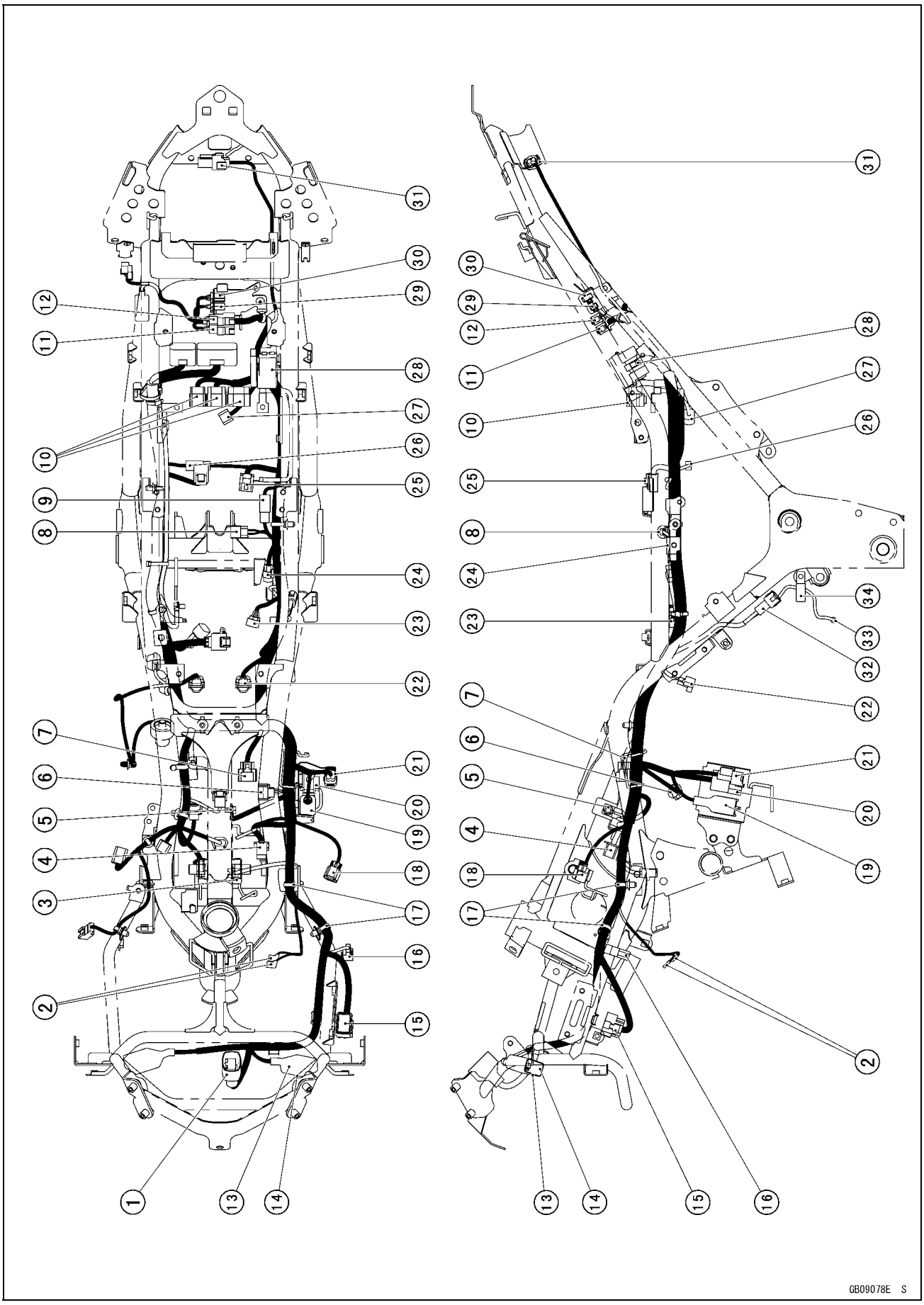
Appendix

Table of Contents

Cable, Wire, and Hose Routing 17-2
Troubleshooting Guide 17-54

Cable, Wire, and Hose Routing

Left Side Main Harness

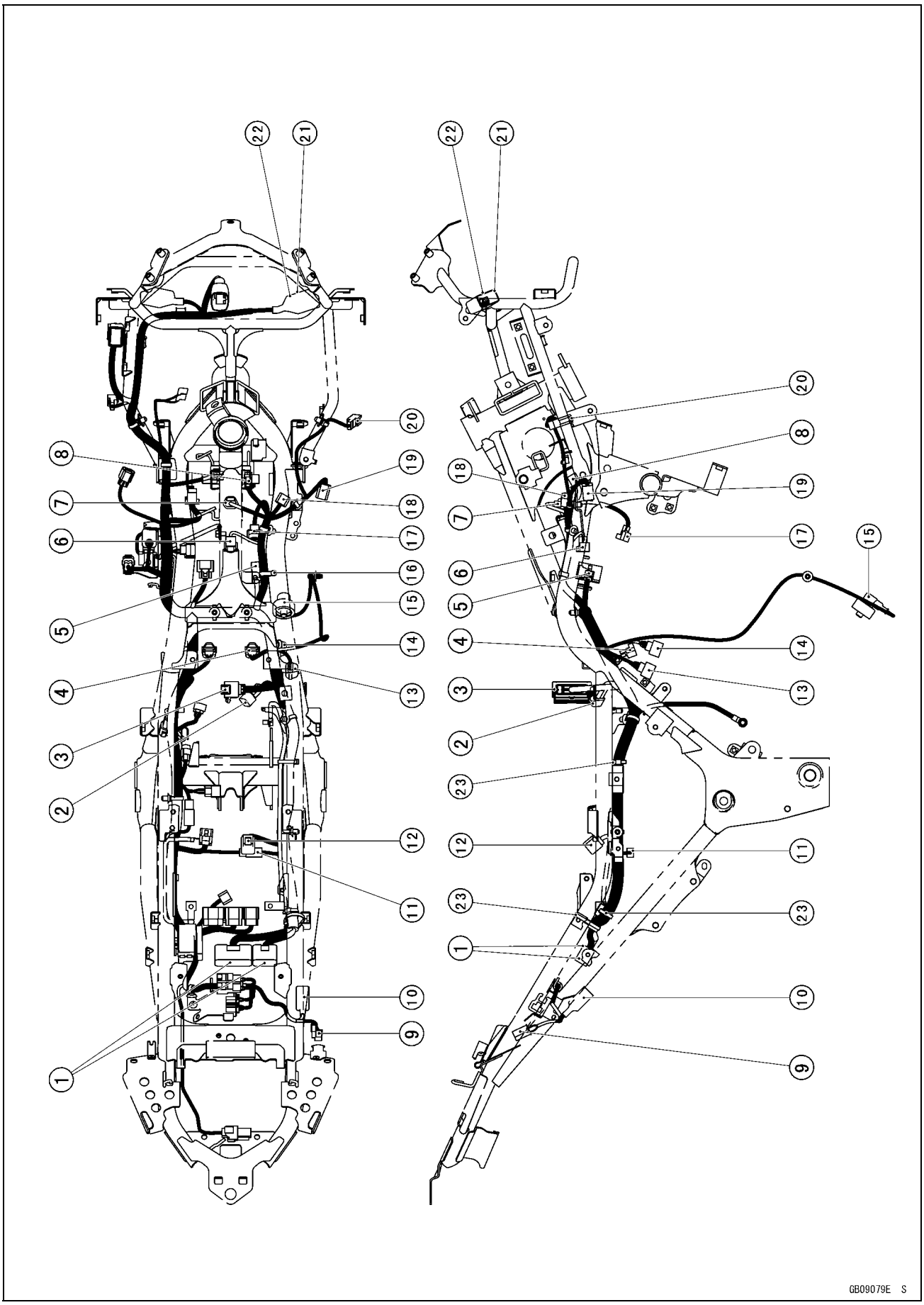


Cable, Wire, and Hose Routing

1. Meter Lead Connector
2. Horn Lead Connectors
3. Radiator Fan Lead Connector
4. Left Switch Housing Lead Connector
5. Frame Ground
6. Stick Coil #1 Lead Connector
7. Intake Air Pressure Sensor Lead Connector
8. Intake Air Temperature Sensor Lead Connector
9. Battery Positive Lead Connector (ABS Equipped Model)
10. Relay Box Lead Connectors
11. Rear Right Turn Signal Light Lead Connector
12. Rear Left Turn Signal Light Lead Connector
13. Headlight (High) Connector
14. City Light Lead Connector
15. Regulator/Rectifier Lead Connector
16. Front Left Turn Signal Light Lead Connector
17. Bands
18. Purge Valve Lead Connector (CAL Model)
19. Crankshaft Sensor Lead Connector
20. Alternator Lead Connector
21. Oxygen Sensor Lead Connector (Equipped Model)
22. Fuel Injector #1 Lead Connector
23. Subthrottle Valve Actuator Lead Connector
24. Speed Sensor Lead Connector
25. Starter Relay Lead Connector
26. Battery Negative Lead Connector
27. Wheel Rotation Sensor Lead Connector (ABS Equipped Model)
28. Fuse Box
29. License Plate Light Lead Connector
30. Tail/Brake Light Lead Connector
31. Kawasaki Diagnostic System Connector
32. Sidestand Switch Lead Connector
33. Neutral Switch Lead Connector
34. Clamp

Cable, Wire, and Hose Routing

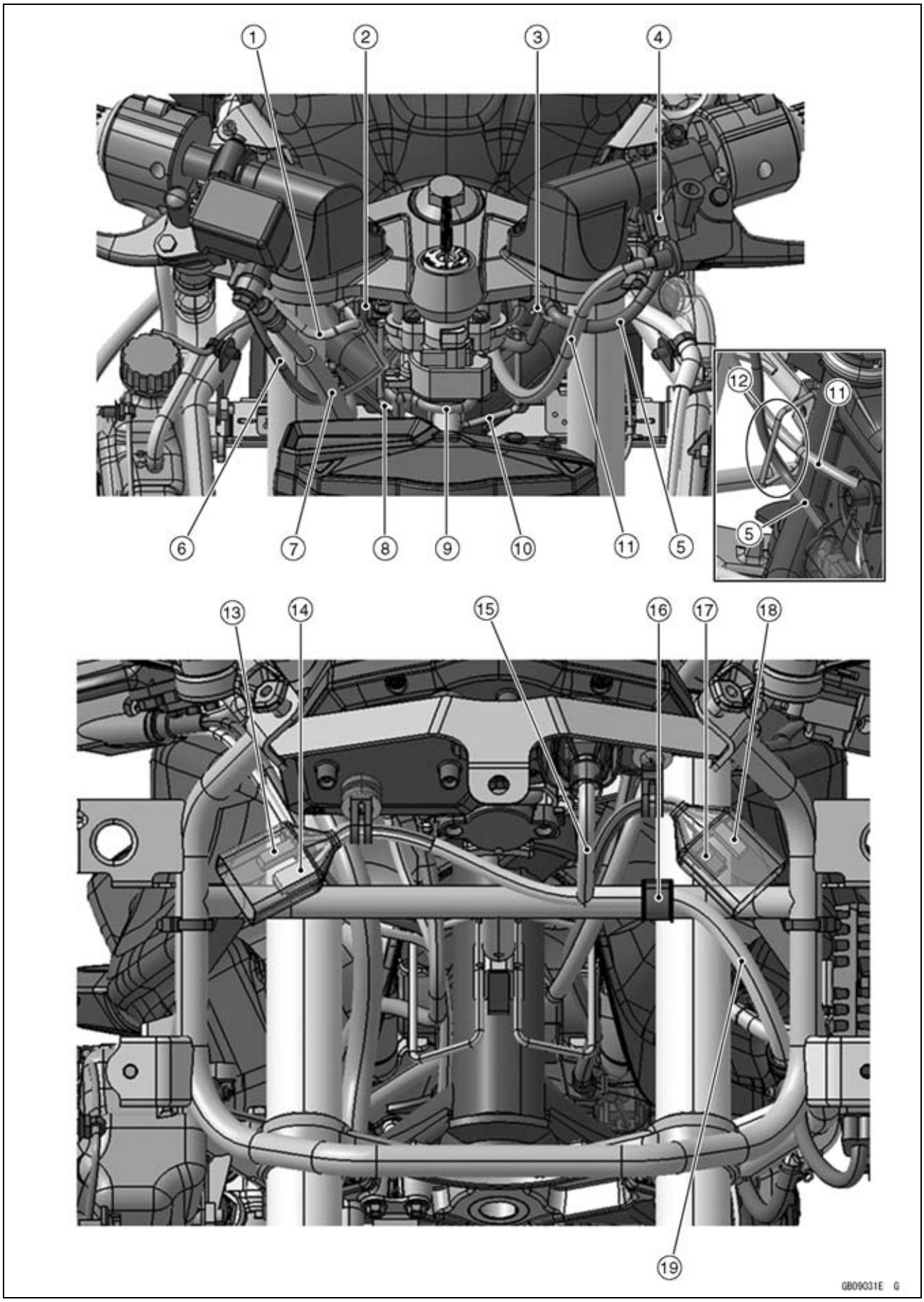
Right Side Main Harness



Cable, Wire, and Hose Routing

1. ECU Lead Connectors
2. Fuel Pump Lead Connector
3. ABS ECU Lead Connector (ABS Equipped Model)
4. Fuel Injector #2 Lead Connector
5. Ignition Switch Lead Connector
6. Air Switching Valve Lead Connector
7. Vehicle-down Sensor Lead Connector
8. Right Switch Housing Lead Connector
9. Turn Signal Light Relay Lead Connector
10. Rear Brake Light Switch Lead Connector
11. Battery Negative Lead Connector
12. ABS Kawasaki Diagnostic System Connector
13. Subthrottle Sensor Lead Connector
14. Main Throttle Sensor Lead Connector
15. Oil Pressure Switch Lead Connector
16. Clamp
17. Stick Coil #2 Lead Connector
18. Wheel Rotation Sensor Lead Connector (ABS Equipped Model)
19. Water Temperature Sensor Lead Connector
20. Front Right Turn Signal Light Lead Connector
21. Headlight (Low) Connector
22. City Light Lead Connector
23. Bands

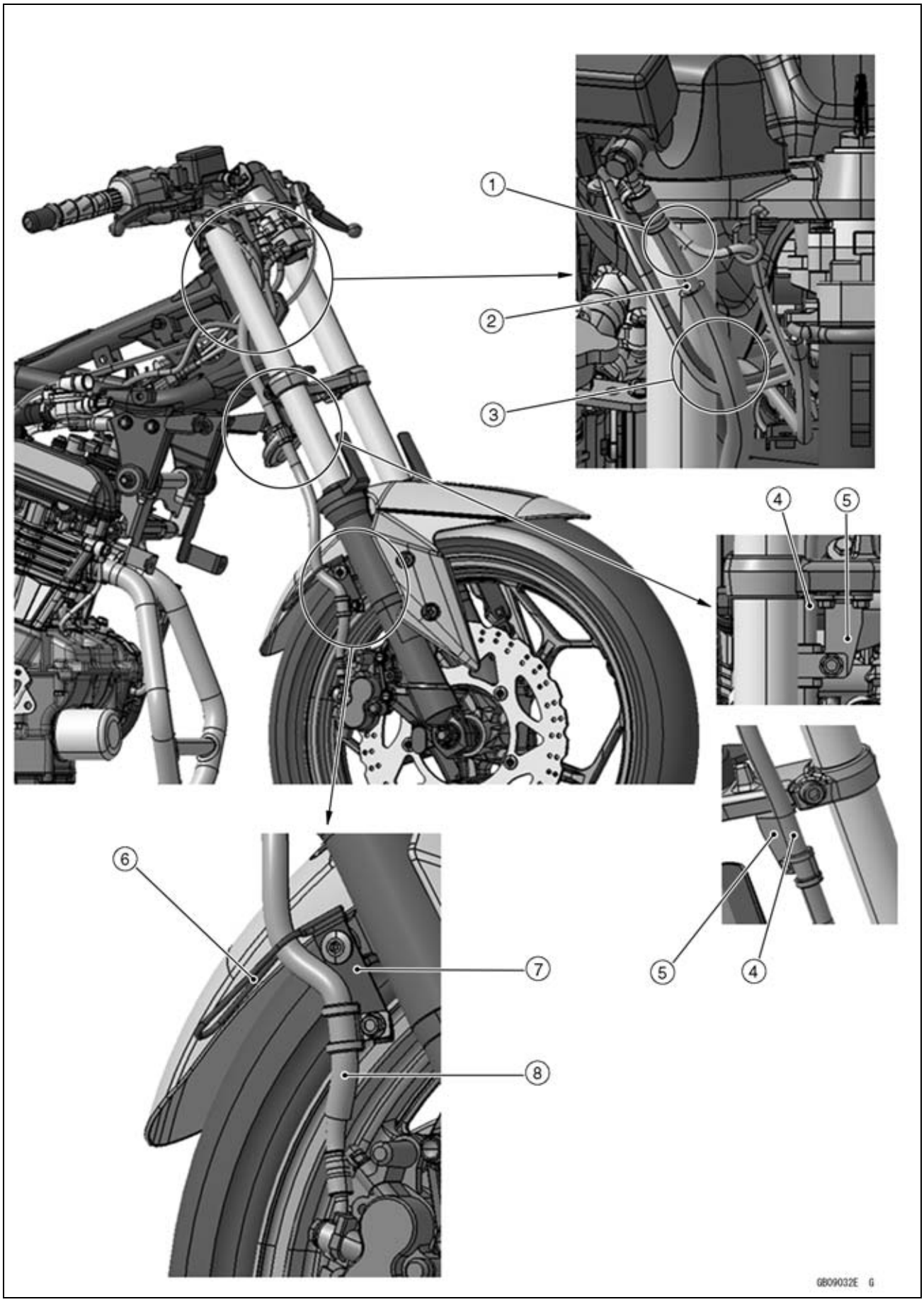
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Right Switch Housing Lead
2. Clamp (Hold the right switch housing lead.)
3. Clamp (Hold the left switch housing lead.)
4. Starter Lockout Switch
5. Left Switch Housing Lead
6. Throttle Cable
7. Brake Hose
8. Guide (Run the throttle cables, right switch housing and ignition switch leads through into the guide.)
9. Ignition Switch Lead
10. Guide (Run the clutch cable and left switch housing lead through into the guide.)
11. Clutch Cable
12. Guide (Run the clutch cable over the left switch housing lead through into the guide.)
13. Right City Light Connector
14. Headlight (Low) Connector
15. Meter Unit Lead
16. Clamp (Hold the main harness and insert the clamp into the frame.)
17. Headlight (High) Connector
18. Left City Light Connector
19. Main Harness

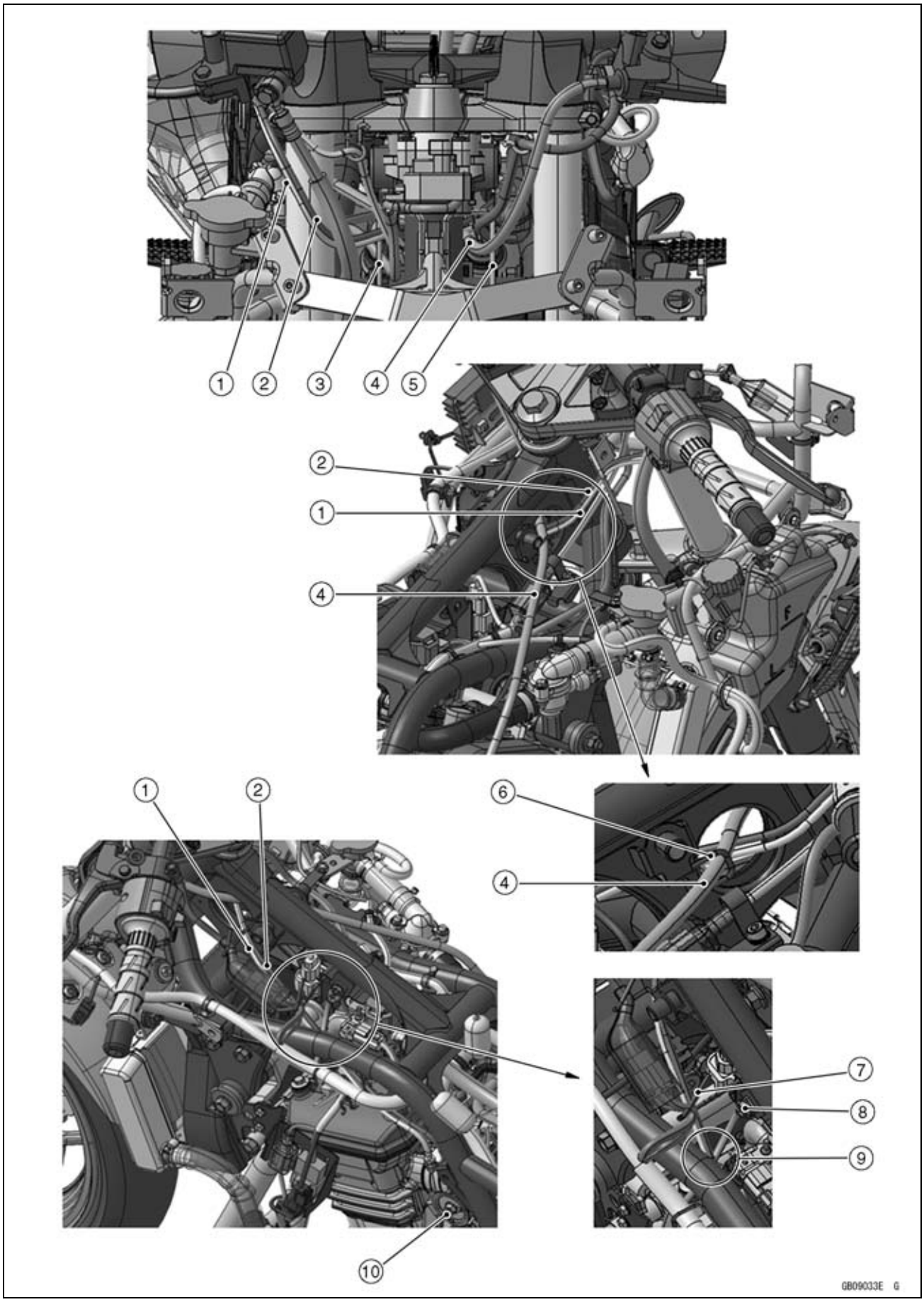
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the brake hose to front of the right switch housing lead.
2. Front Brake Hose
3. Run the front brake hose to front of the throttle cables.
4. Front Brake Hose
5. Bracket (Hold the front brake hose.)
6. Guide (Run the front brake hose through into the guide.)
7. Bracket (Hold the front brake hose.)
8. Front Brake Hose

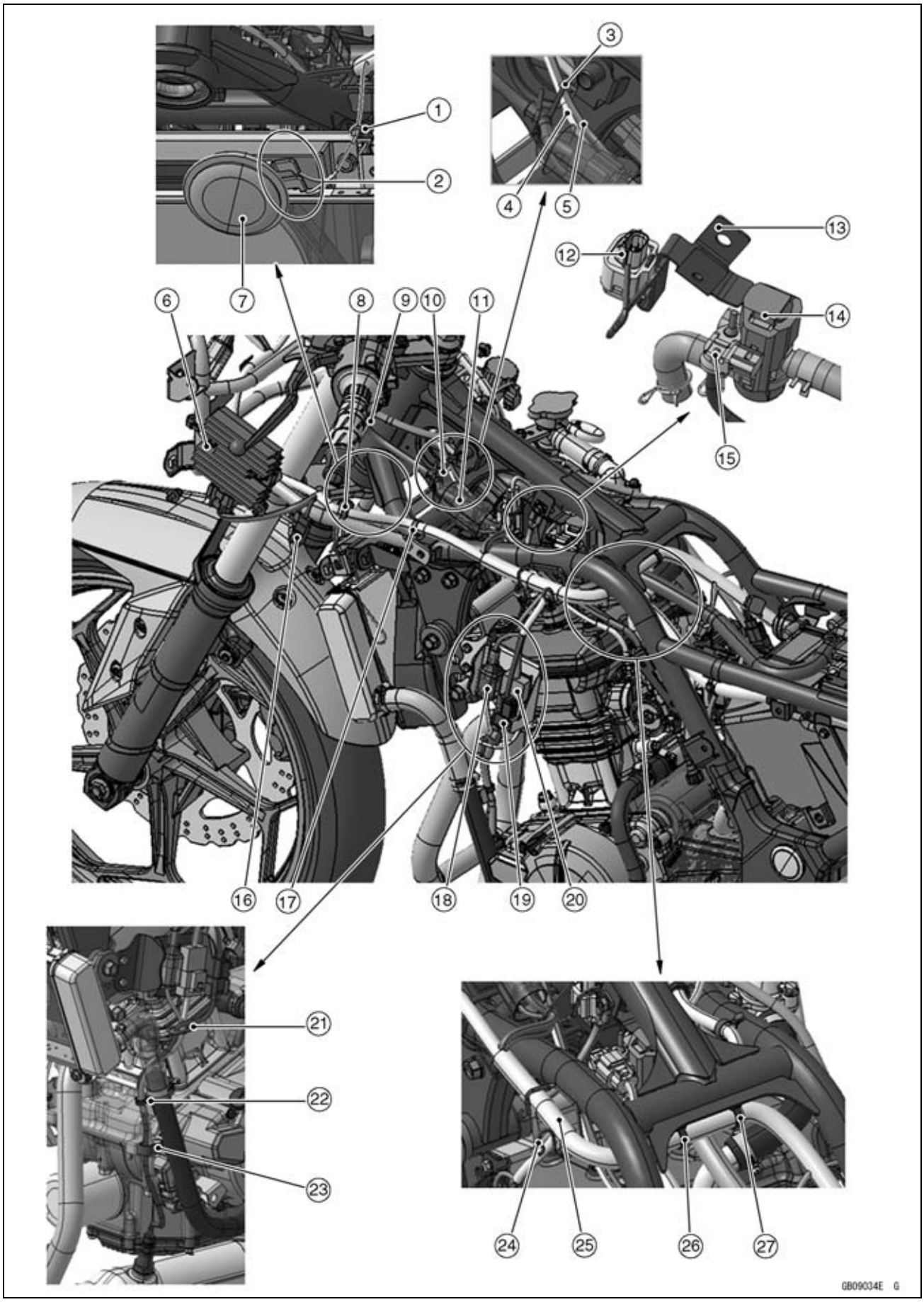
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Throttle Cable (Decelerator)
2. Throttle Cable (Accelerator)
3. Guide (Run the throttle cables, right switch housing and ignition switch leads through into the guide.)
4. Clutch Cable
5. Guide (Run the clutch cable and left switch housing lead through into the guide.)
6. Guide (Run the clutch cable through into the guide.)
7. Guide (Run the left switch housing lead and throttle cables through into the guide.)
8. Frame Ground Lead
9. Run the throttle cables to over the frame ground lead.
10. Throttle Body Assy

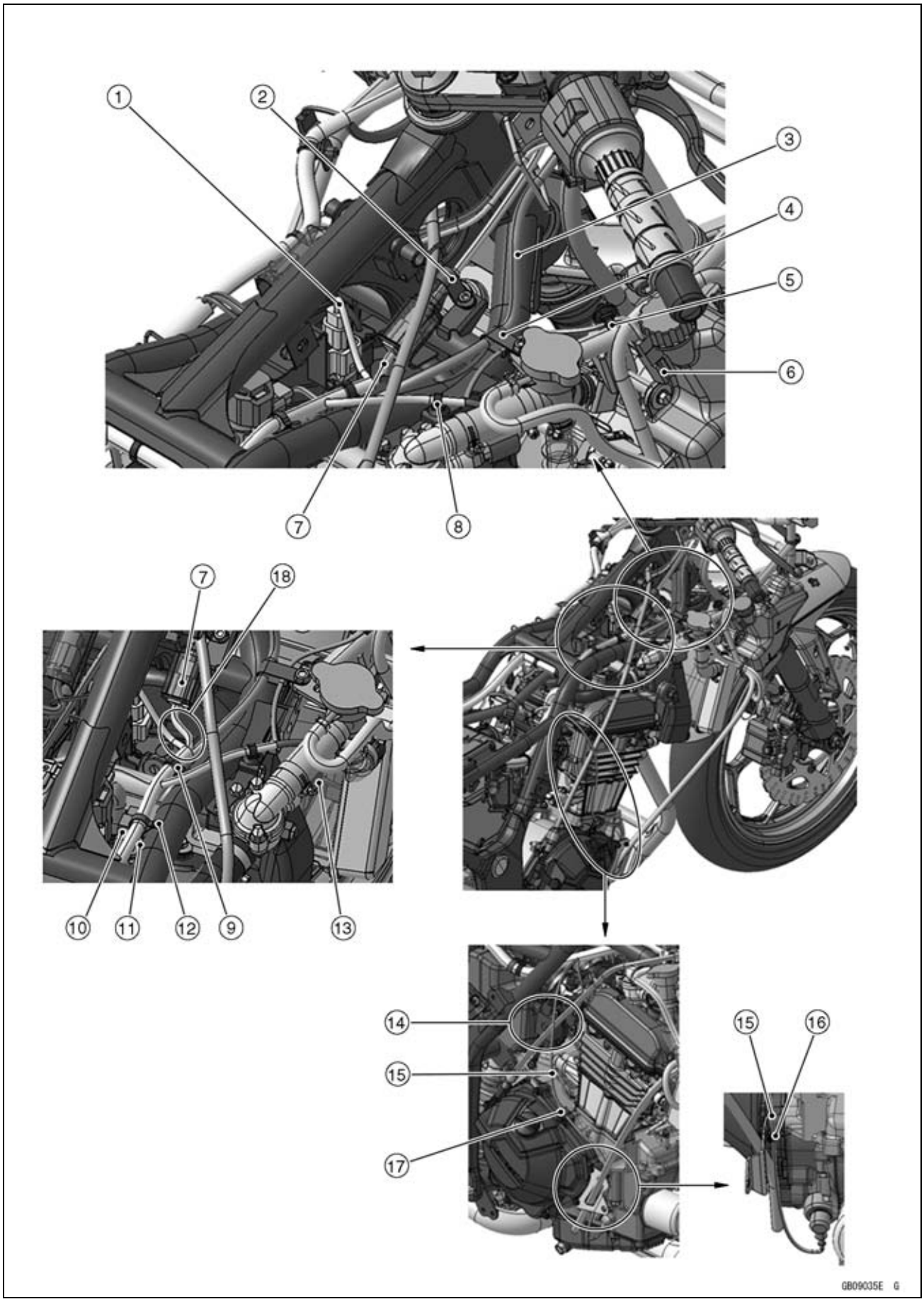
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Guide (Run the horn lead through into the guide.)
2. Horn Lead
3. Guide (Run the throttle cables through into the guide.)
4. Throttle Cable (Decelerator)
5. Throttle Cable (Accelerator)
6. Regulator/Rectifier
7. Horn
8. Band (Hold the main harness to the upper fairing bracket.)
9. Guide (Run the left switch housing lead through into the guide.)
10. Guide (Run the throttle cables through into the guide.)
11. Left Switch Housing Lead Connector
12. Vehicle-down Sensor
13. Bracket
14. Air Switching Valve
15. Intake Air Pressure Sensor
16. Front Left Turn Signal Light Lead Connector
17. Band (Hold the main harness to the frame pipe.)
18. Crankshaft Sensor Lead Connector
19. Oxygen Sensor Lead Connector (Equipped Model)
20. Alternator Lead Connector
21. Guide (Run the crankshaft sensor lead, oxygen sensor lead and alternator lead through into the guide.)
22. Band (Hold the crankshaft sensor lead, oxygen sensor lead and alternator lead together with the water pipe.)
23. Clamp (Hold the crankshaft sensor lead, oxygen sensor lead and alternator lead.)
24. Guide (Run the main harness into the guide.)
25. Main Harness
26. Band (Hold the main harness to the frame pipe.)
27. Band (Hold the main harness to the frame.)

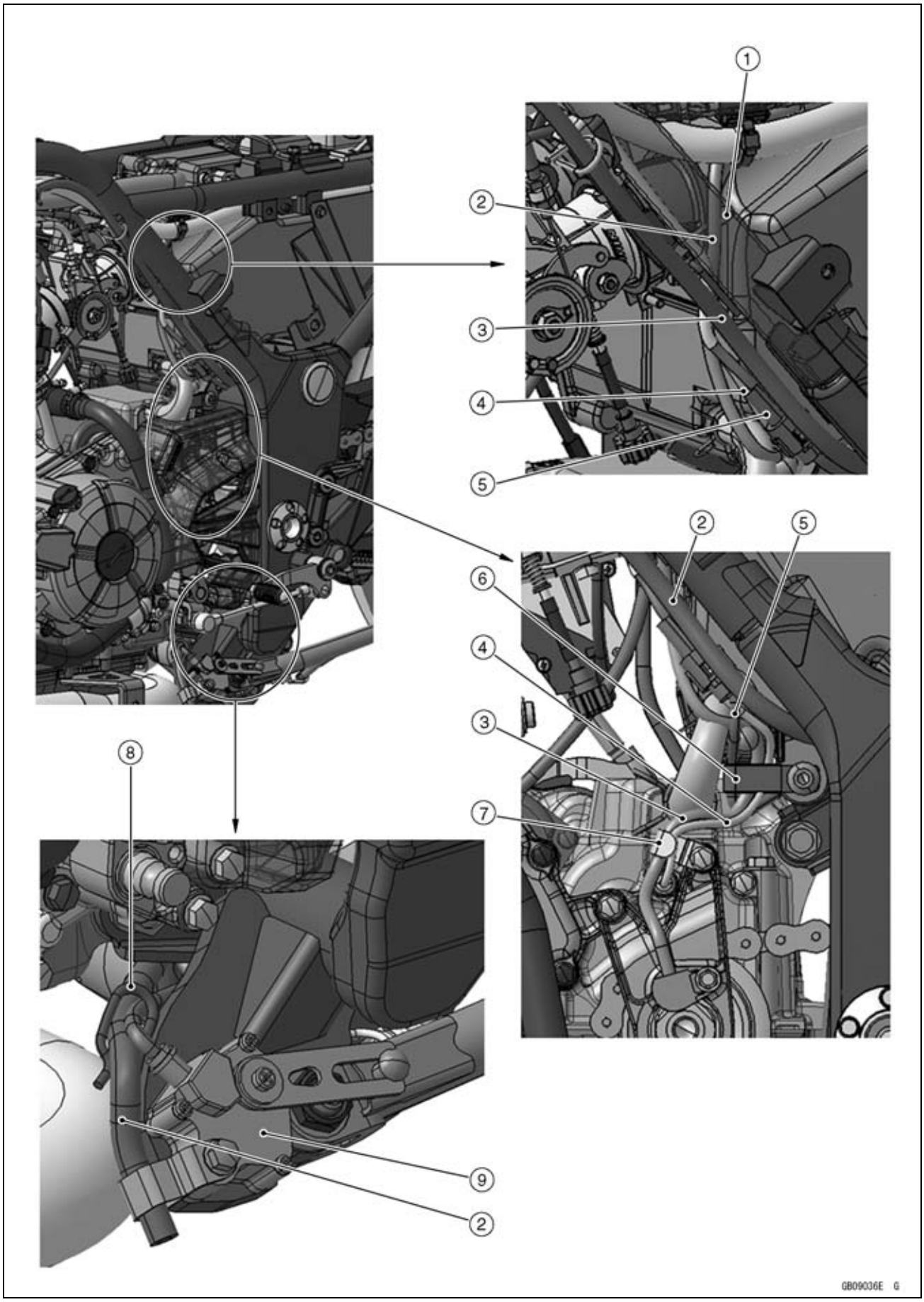
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Vehicle-down Sensor Lead
2. Clamp (Hold the right switch housing lead and fix the clamp into the frame.)
3. Ignition Switch Lead
4. Clamp (Hold the ignition switch lead and front right turn signal light lead and fix the clamp into the upper fairing bracket.)
5. Band (Hold the front right turn signal light lead together with the upper fairing bracket.)
6. Front Right Turn Signal Light Lead Connector
7. Right Switch Housing Lead
8. Band (Hold the water temperature sensor lead together with the frame.)
9. Hold the main harness to the frame with the band, and cut the band excess length after tying it.
10. Ignition Switch Lead Connector
11. Ignition Switch Lead Connector (Hold the connector to the bracket on the frame.)
12. Hold the main harness to the frame with the band, and cut the band excess length after tying it.
13. Water Temperature Sensor
14. Run the oil pressure switch lead to outside of the clutch cable.
15. Oil Pressure Switch Lead
16. Band (Hold the oil pressure switch lead with the bracket.)
17. Clamp (Hold the oil pressure switch lead.)
18. Run the ignition switch lead under the main harness.

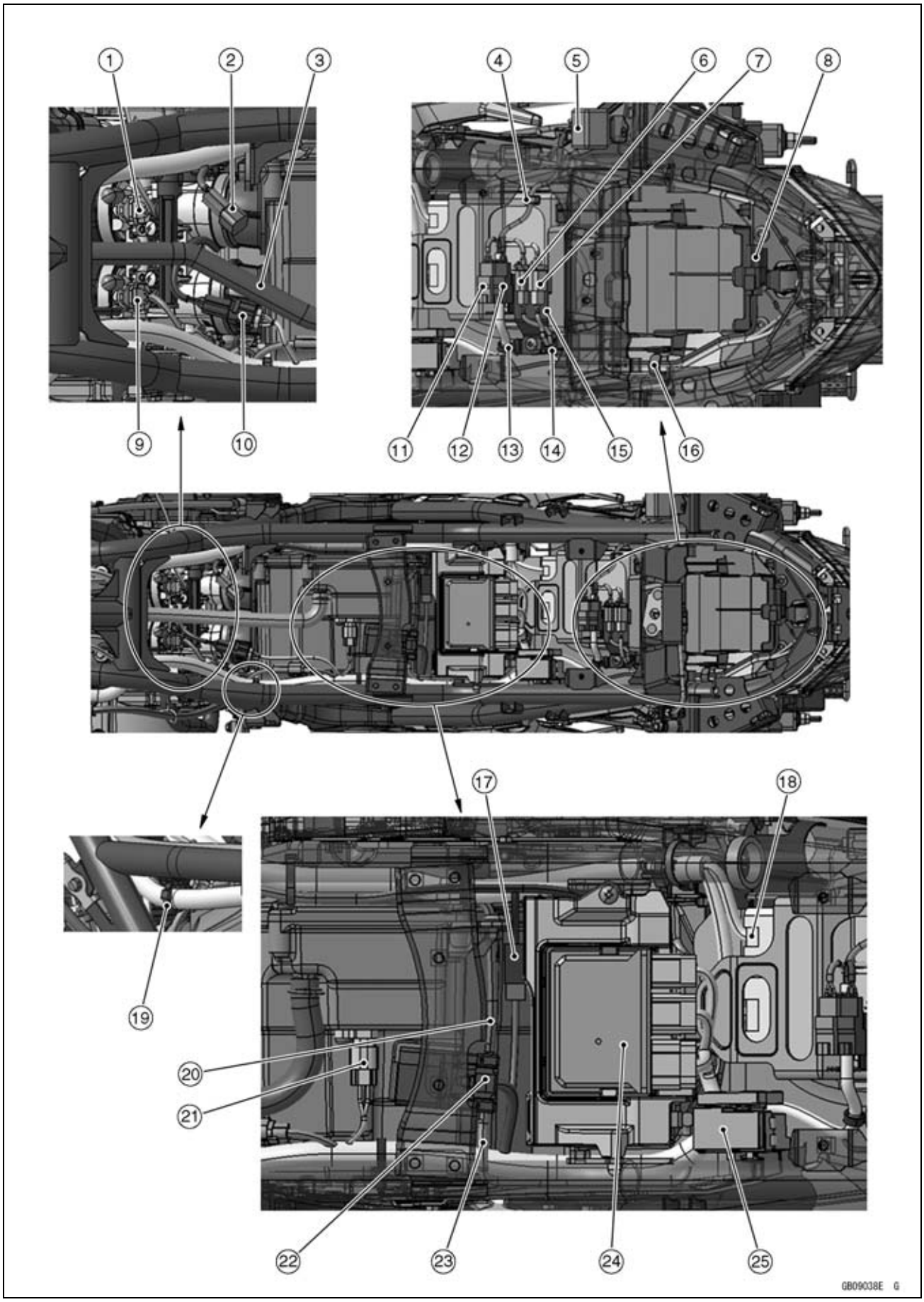
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Guide (Run the sidestand switch lead, neutral switch lead and speed sensor lead through into the guide.)
2. Drain Hose
3. Speed Sensor Lead
4. Neutral Switch Lead
5. Sidestand Switch Lead
6. Clamp (Hold the neutral switch lead and speed sensor lead.)
7. Clamp (Hold the neutral switch lead and speed sensor lead.)
8. Guide (Run the sidestand switch lead and drain hose through into the guide.)
9. Sidestand Switch

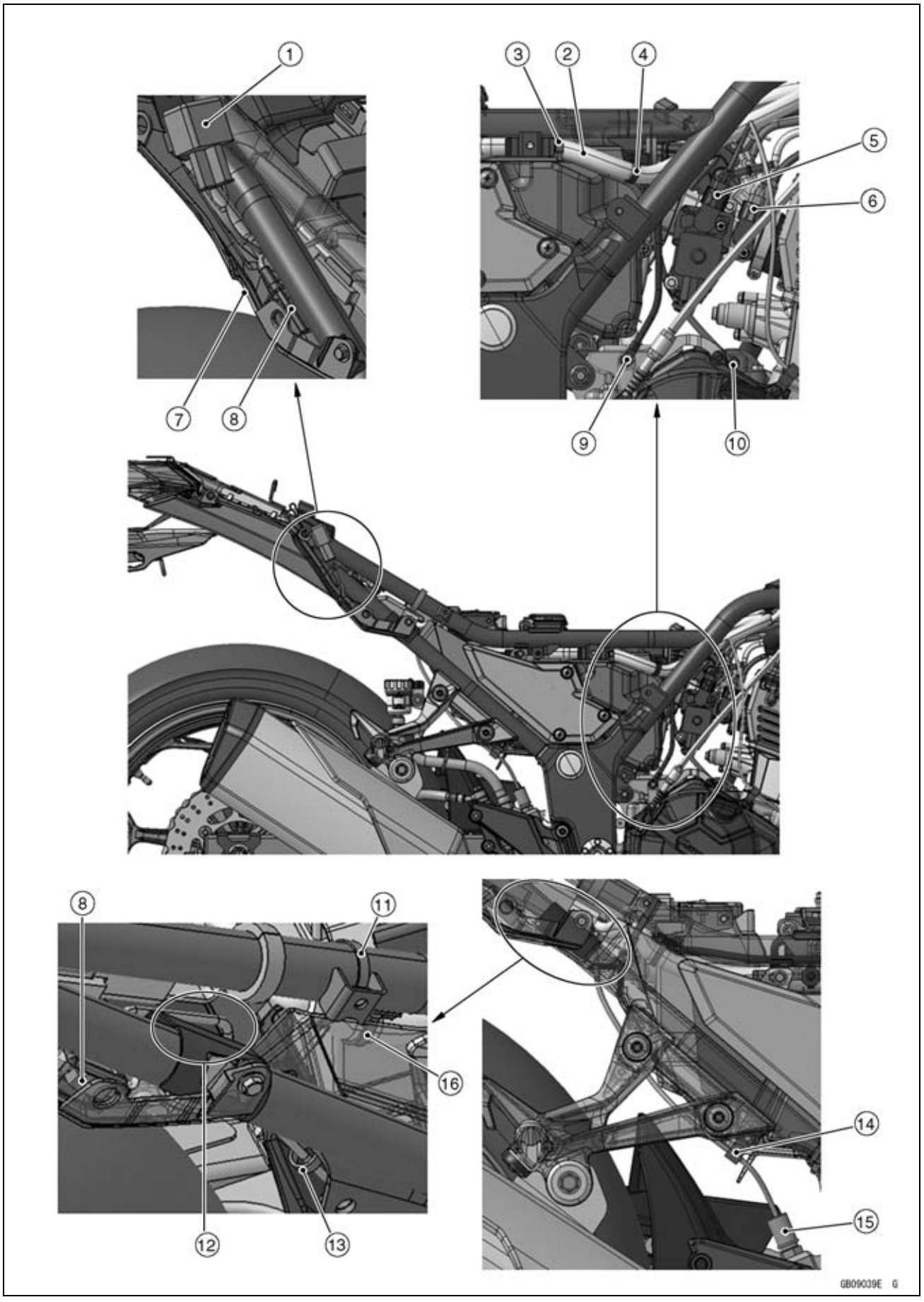
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Fuel Injector #2
2. Fuel Pump Lead Connector
3. Air Switching Valve Hose
4. Guide (Run the turn signal relay lead through into the guide.)
5. Turn Signal Relay
6. License Plate Light Lead Connector
7. Tail/Brake Light Lead Connector
8. Kawasaki Diagnostic System Connector
9. Fuel Injector #1
10. Subthrottle Valve Actuator Lead Connector
11. Rear Right Turn Signal Light Lead Connector
12. Rear Left Turn Signal Light Lead Connector
13. Band (Hold the main harness to the bracket.)
14. Band (Hold the license plate light lead, tail/brake light lead, rear right turn signal light lead and rear left turn signal light lead to the bracket.)
15. Bracket
16. Clamp (Hold the main harness to the rear fender.)
17. Battery Negative Cable
18. ECU Lead Connectors
19. Hold the main harness to the frame with the band, and cut the band excess length after tying it.
20. Starter Motor Cable
21. Intake Air Temperature Sensor Lead Connector
22. Starter Relay Lead Connector
23. Battery Positive Cable
24. Relay Box
25. Fuse Box

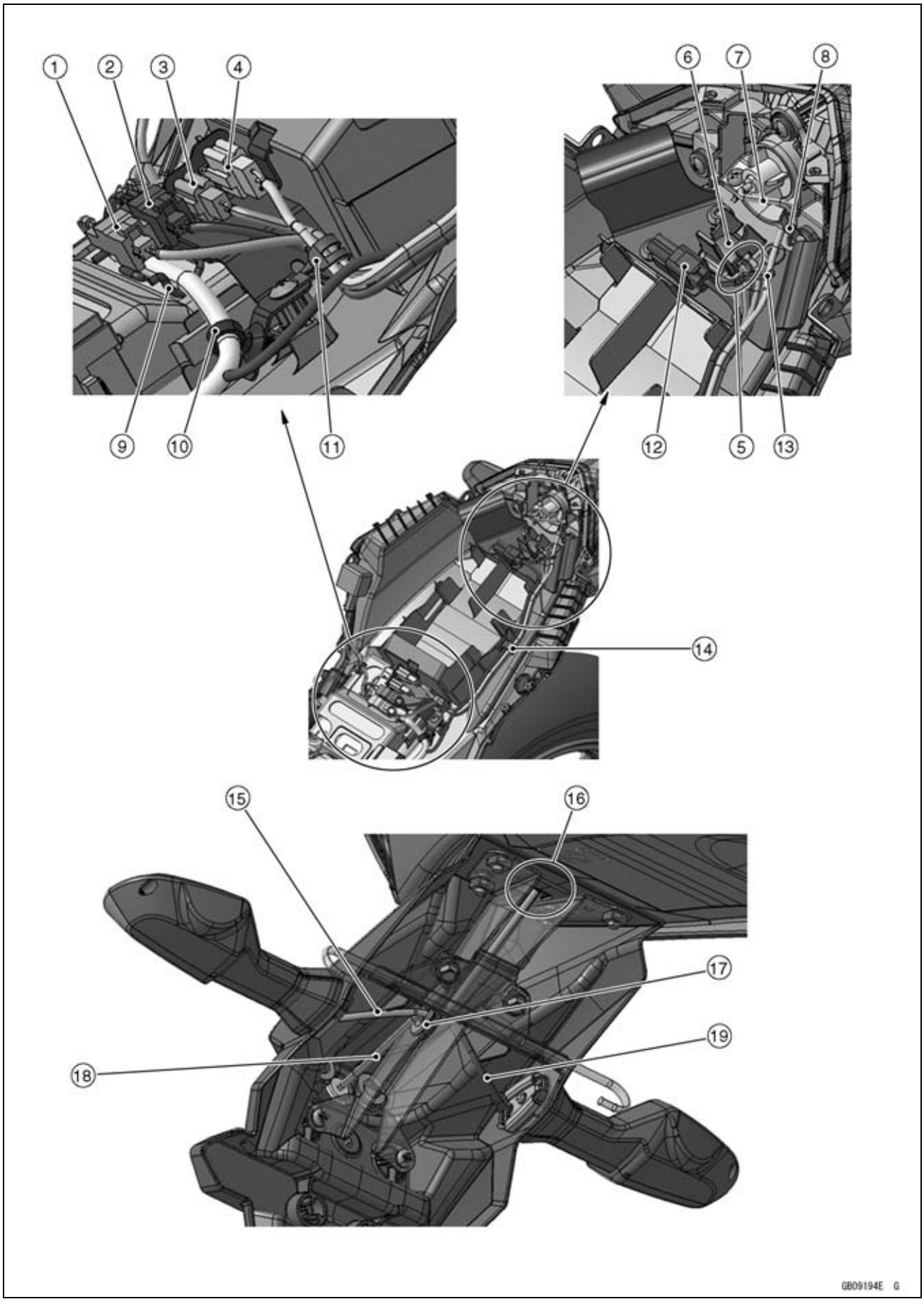
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Turn Signal Relay
2. Main Harness
3. Band (Hold the main harness to the frame.)
4. Band (Hold the main harness, battery negative cable and starter motor cable. Do not hold them to the frame.)
5. Subthrottle Sensor
6. Main Throttle Sensor
7. Rear Fender
8. Rear Brake Light Switch Lead
9. Engine Ground Terminal
10. Starter Motor Cable Terminal
11. Band
12. Run the rear brake light switch lead through the hole on the rear fender.
13. Band (Hold the rear brake light switch lead at the white mark on the lead.)
14. Clamp (Hold the rear brake light switch lead.)
15. Rear Brake Light Switch
16. Band

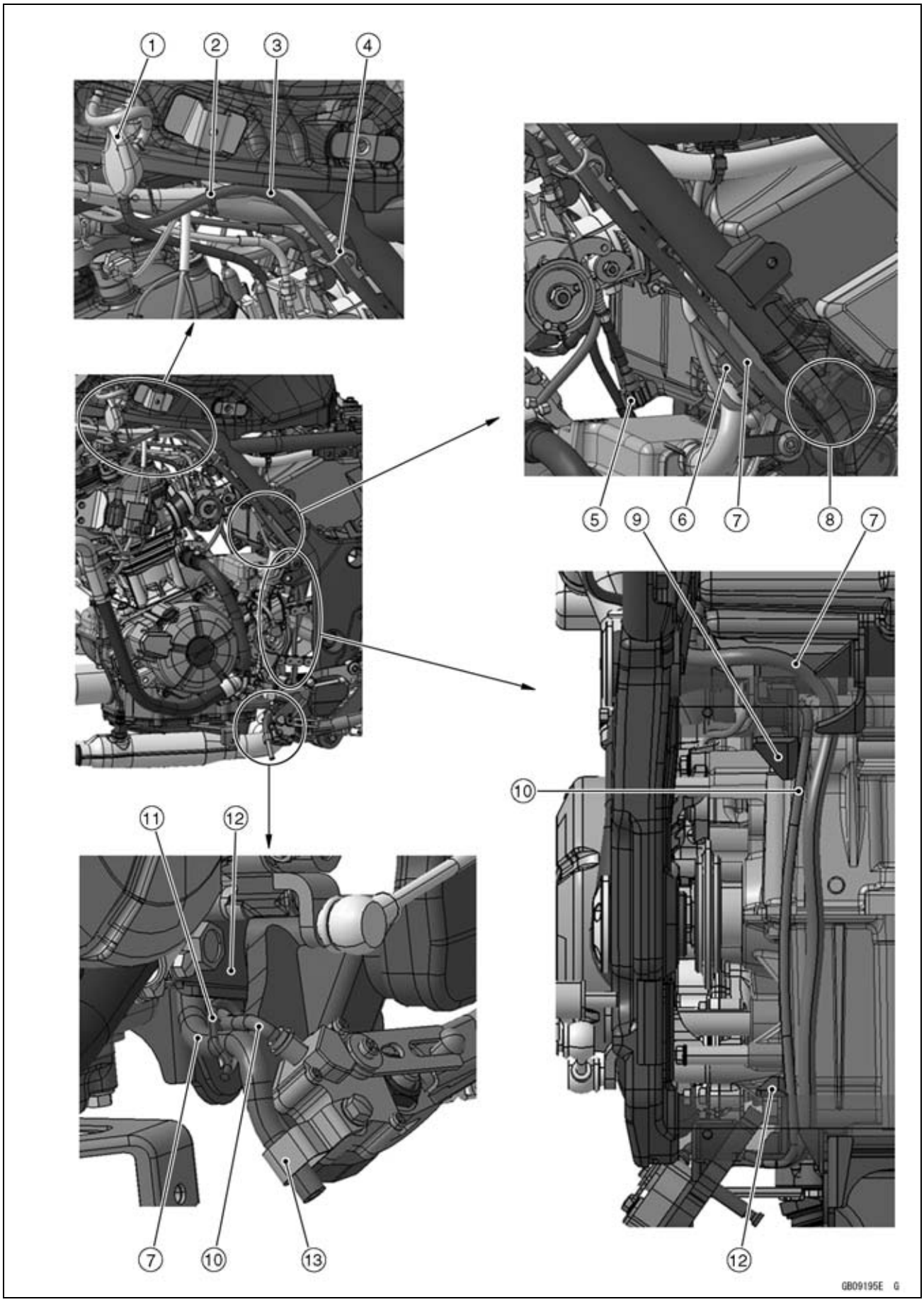
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Rear Right Turn Signal Light Lead Connector
2. Rear Left Turn Signal Light Lead Connector
3. License Plate Light Lead Connector
4. Tail/Brake Light Lead Connector
5. Run the license plate light lead, rear left turn signal light lead and rear right turn signal light lead through into the guide.
6. Cover
7. Tail/Brake Light Lead
8. Clamp (Hold the tail/brake light lead to the bracket.)
9. Guide (Run the main harness over the guide.)
10. Band (Hold the main harness with the bracket.)
11. Clamp (Hold the license plate light lead, rear left turn signal light lead, rear right turn signal light lead and tail/brake light lead to the bracket.)
12. Kawasaki Diagnostic System Connector
13. Guide (Run the license plate light lead, rear left turn signal light lead and rear right turn signal light lead through into the guide.)
14. Clamp (Hold the license plate light lead, rear left turn signal light lead, rear right turn signal light lead, tail/brake light lead and main harness to the rear fender.)
15. Rear Right Turn Signal Light Lead
16. Run the license plate light lead, rear left turn signal light lead and rear right turn signal light lead into the hole of the rear fender.
17. Trim (Run the license plate light lead and rear right turn signal light lead through the trim.)
18. License Plate Light Lead
19. Rear Left Turn Signal Light Lead

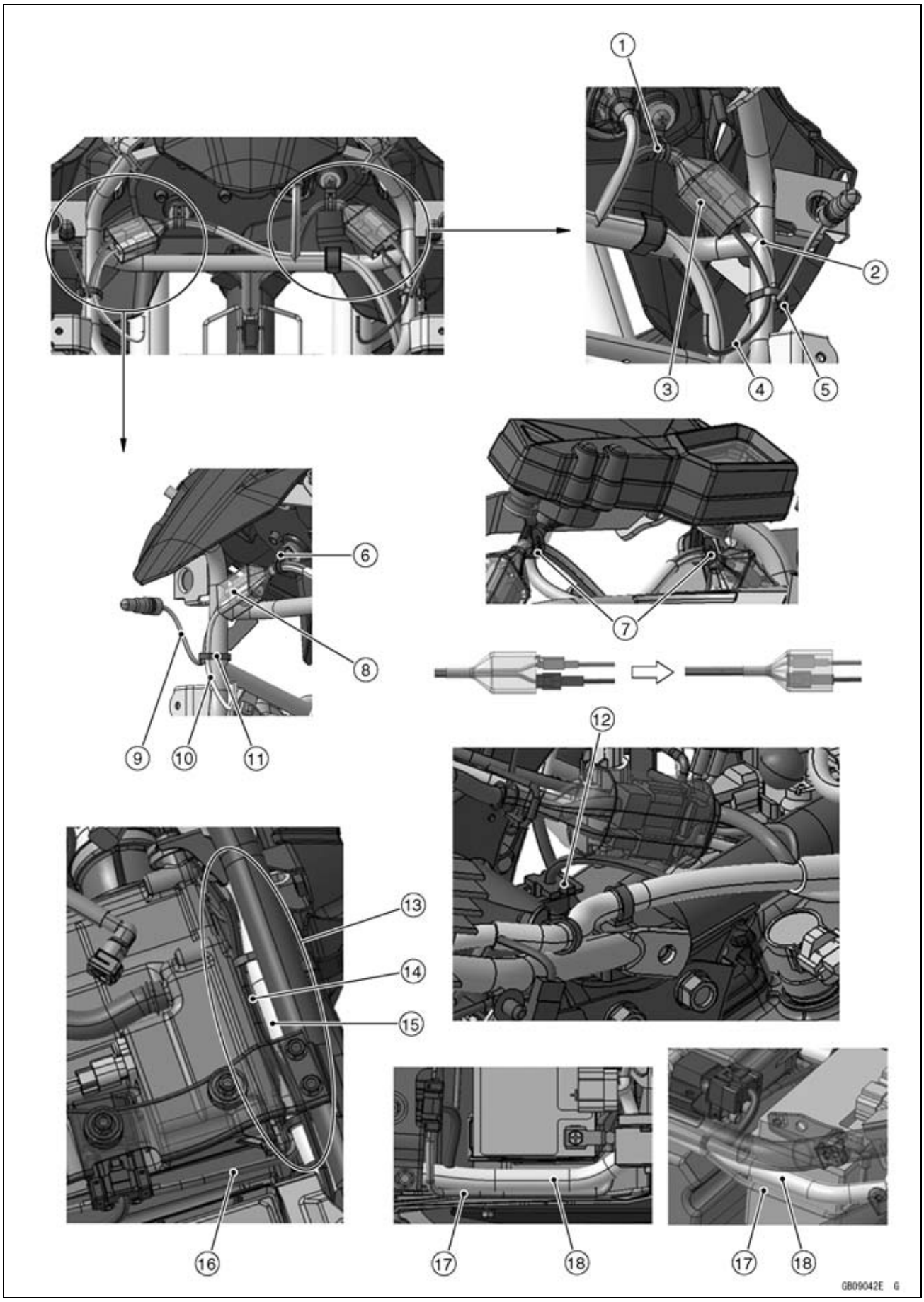
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Fuel Tank Breather Hose
2. Guide (Run the fuel tank breather hose through into the guide.)
3. Drain Hose
4. Clamp (Hold the fuel tank drain hose with the frame.)
5. Adjusting Screw
6. Sidestand Switch Lead Connector
7. Fuel Tank Drain Hose
8. Run the fuel tank drain hose under the air cleaner housing.
9. Engine Bracket
10. Sidestand Switch Lead
11. Guide (Run the fuel tank drain hose and sidestand switch lead through into the guide.)
12. Engine Bracket
13. Clamp (Hold the fuel tank drain hose with the sidestand switch.)

Cable, Wire, and Hose Routing

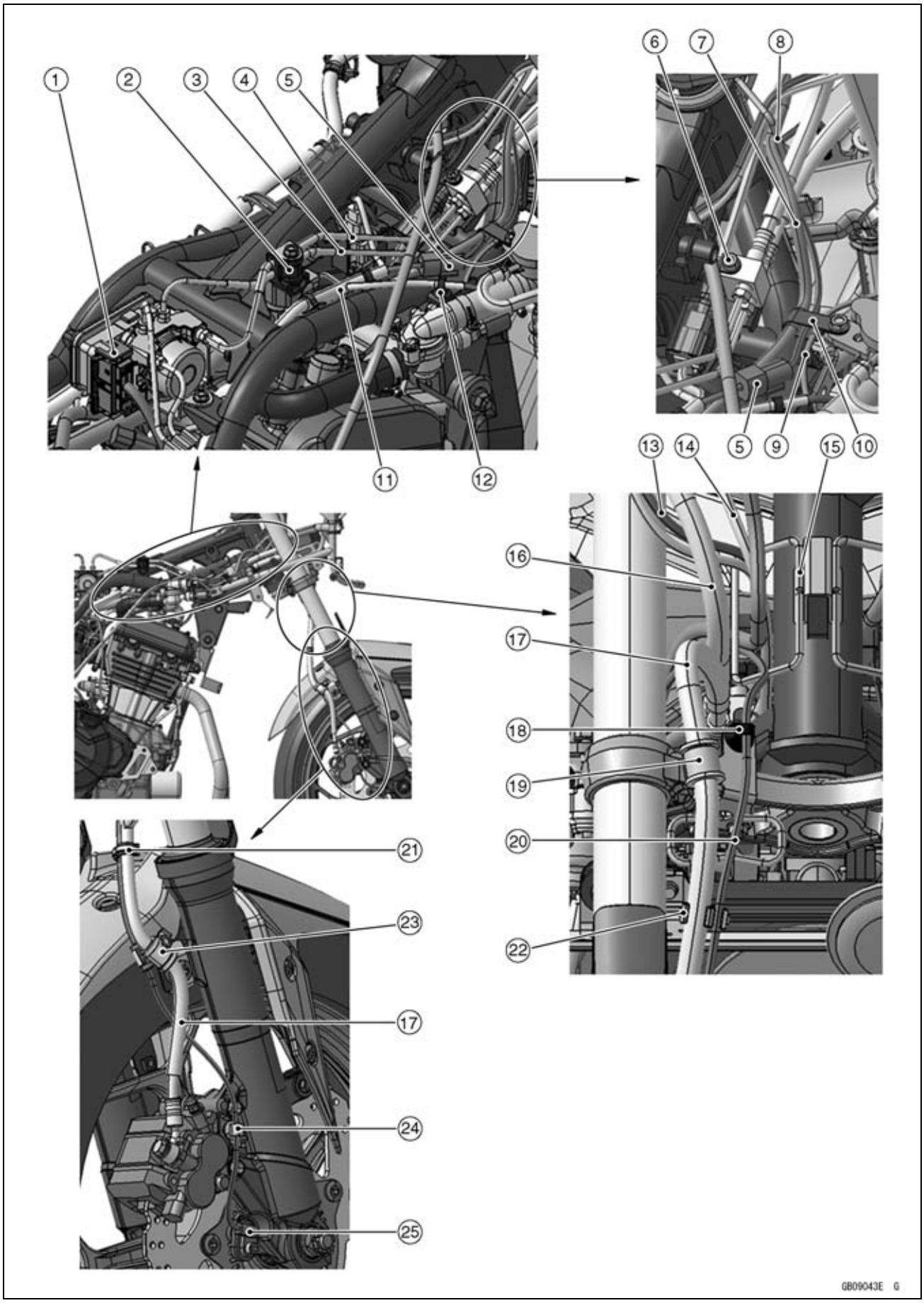


Cable, Wire, and Hose Routing

1. Clamp (Hold the left city light lead and headlight (high) lead and fix the clamp into the upper fairing bracket.)
2. Left City Light Lead
3. Cover
4. Headlight (High) Lead
5. Band (Hold the left city light lead and headlight (high) lead to the upper fairing bracket.)
6. Clamp (Hold the right city light lead and headlight (low) lead and fix the clamp to the meter.)
7. Clamp (Hold the leads.)
8. Cover
9. Right City Light Lead
10. Headlight (Low) Lead
11. Band (Hold the right city light lead and headlight (low) lead to the frame.)
12. Radiator Fan Connector
13. Run the leads to inside of the main harness.
14. Battery Negative Cable
15. Main Harness
16. Starter Motor Cable
17. Battery Positive Cable
18. Main Harness

Cable, Wire, and Hose Routing

ABS Equipped Models

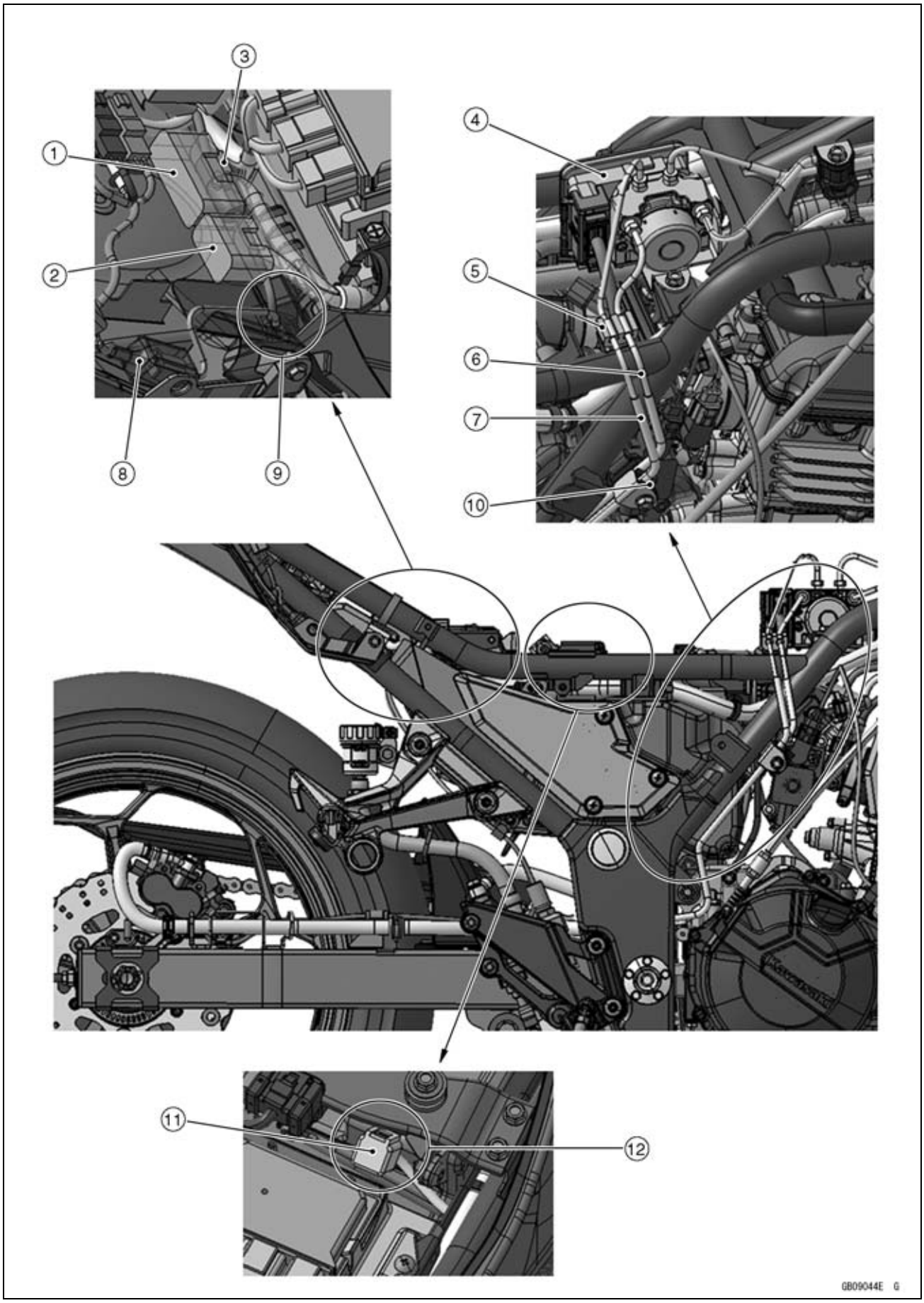


Cable, Wire, and Hose Routing

1. ABS Hydraulic Unit
2. Damper (Hold the brake pipes to bracket on frame.)
3. Brake Pipe (ABS Hydraulic Unit ~ Front Caliper)
4. Brake Pipe (Front Master Cylinder ~ ABS Hydraulic Unit)
5. Front Wheel Rotation Sensor Connector
6. Clamp (Hold the brake pipes.)
7. Ignition Switch Lead
8. Guide (Run the leads.)
9. Front Right Turn Signal Light Lead
10. Clamp (Hold the front right turn signal light lead, wheel rotation sensor lead and ignition switch lead and insert the clamp to the thermostat housing.)
11. Main Harness
12. Band (Hold the water temperature sensor lead.)
13. Throttle Cable
14. Clutch Cable
15. Guide (Run the leads.)
16. Front Brake Hose
17. Front Brake Hose
18. Band (Hold the front wheel rotation sensor lead.)
19. Clamp (Hold the front brake hose.)
20. Front Wheel Rotation Sensor Lead
21. Clamp (Hold the front wheel rotation sensor lead and brake hose.)
22. Clamp (Hold the front wheel rotation sensor lead and brake hose.)
23. Clamp (Hold the front wheel rotation sensor lead and brake hose to front fender.)
24. Clamp (Hold the front wheel rotation sensor lead.)
25. Front Wheel Rotation Sensor

Cable, Wire, and Hose Routing

ABS Equipped Models

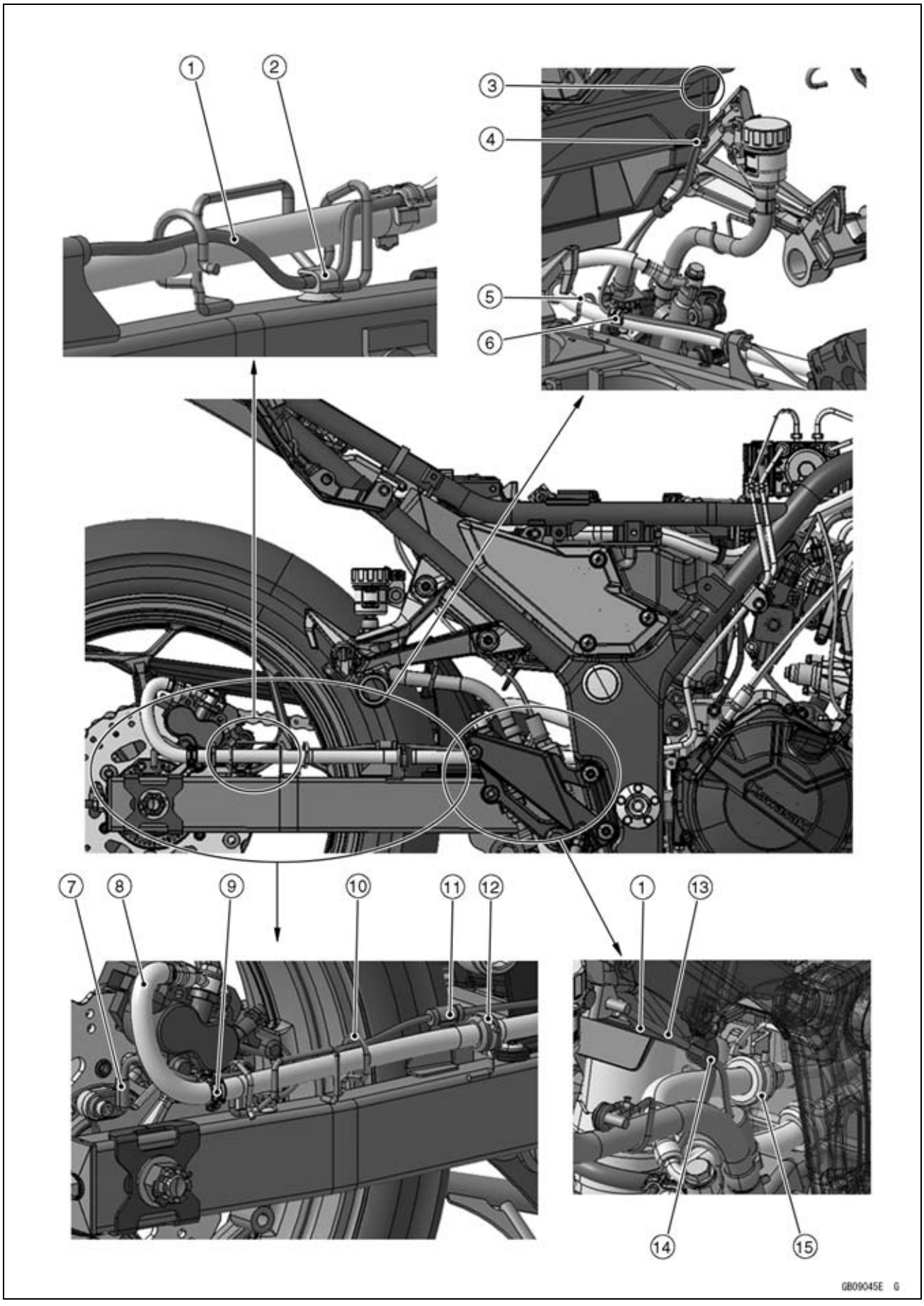


Cable, Wire, and Hose Routing

1. ECU Lead Connectors
2. ECU Lead Connectors
3. Wheel Rotation Sensor Lead Connector
4. ABS Hydraulic Unit
5. Damper (Hold the brake pipes to bracket on frame.)
6. Brake Pipe (ABS Hydraulic Unit ~ Rear Caliper)
7. Brake Pipe (ABS Hydraulic Unit ~ Rear Master Cylinder)
8. Rear Brake Switch Connector
9. Run the rear wheel rotation sensor lead and rear brake switch lead into the hole of the rear fender.
10. Damper (Hold the brake pipes to bracket on frame.)
11. ABS Kawasaki Diagnostic System Connector
12. Hold the ABS Kawasaki Diagnostic System Connector to the fuel tank bracket.

Cable, Wire, and Hose Routing

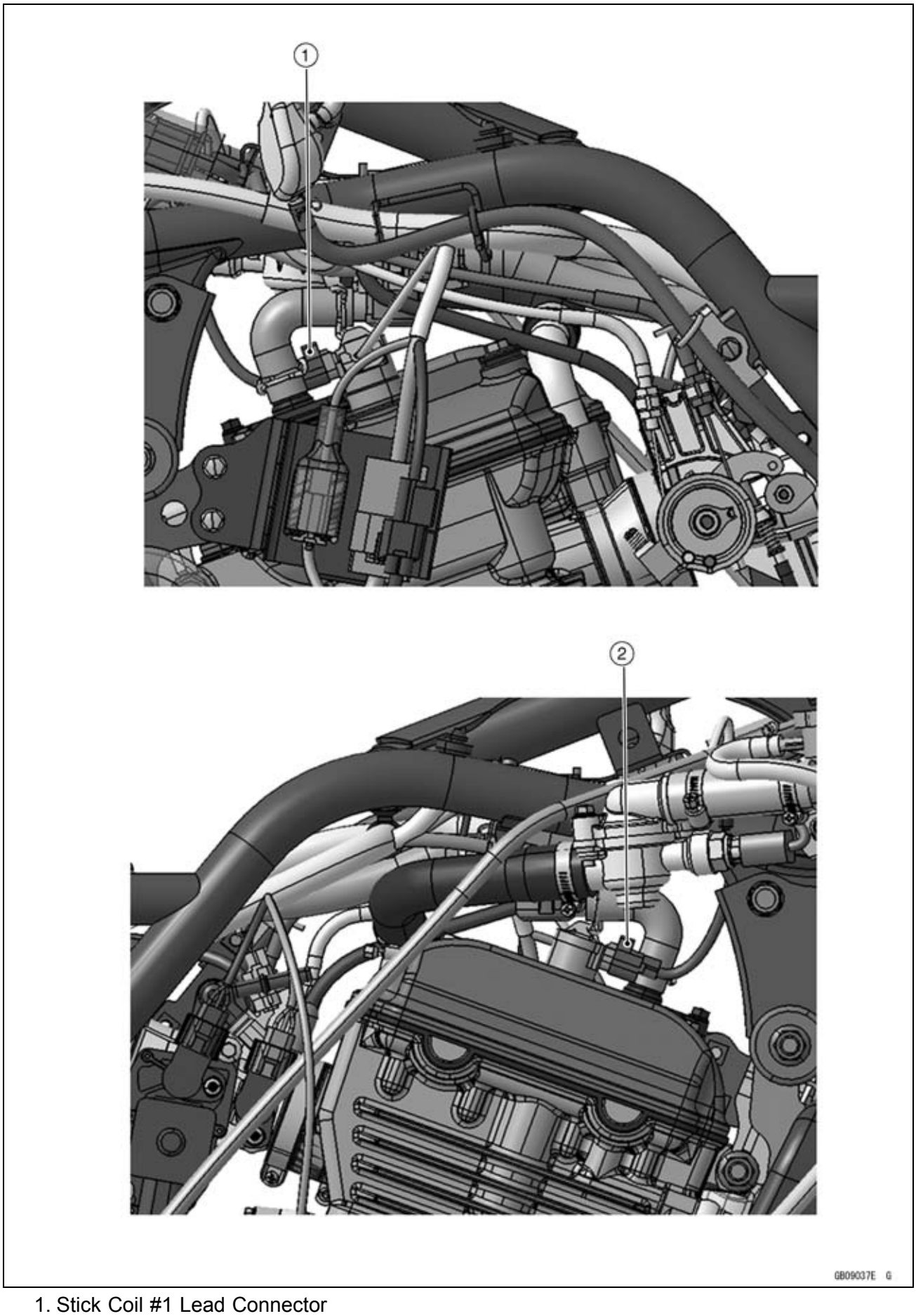
ABS Equipped Models



Cable, Wire, and Hose Routing

1. Rear Wheel Rotation Sensor Lead
2. Clamp (Hold the rear wheel rotation sensor lead to the swingarm.)
3. Run the rear wheel rotation sensor lead and rear brake switch lead into the hole of the rear fender.
4. Band (Hold the rear wheel rotation sensor lead and rear brake switch lead to the rear fender.)
5. Guide (Run the rear brake hose into the guide.)
6. Clamp (Hold the rear wheel rotation sensor lead and rear brake hose.)
7. Rear Wheel Rotation Sensor
8. Rear Brake Hose
9. Clamp (Hold the rear wheel rotation sensor lead and rear brake hose.)
10. Guide (Run the rear wheel rotation sensor lead and rear brake hose into the guide.)
11. Clamp (Hold the rear wheel rotation sensor lead.)
12. Clamp (Hold the rear brake hose.)
13. Rear Brake Switch Lead
14. Clamp (Hold the rear wheel rotation sensor lead and rear brake switch lead.)
15. Clamp (Hold the rear brake hose.)

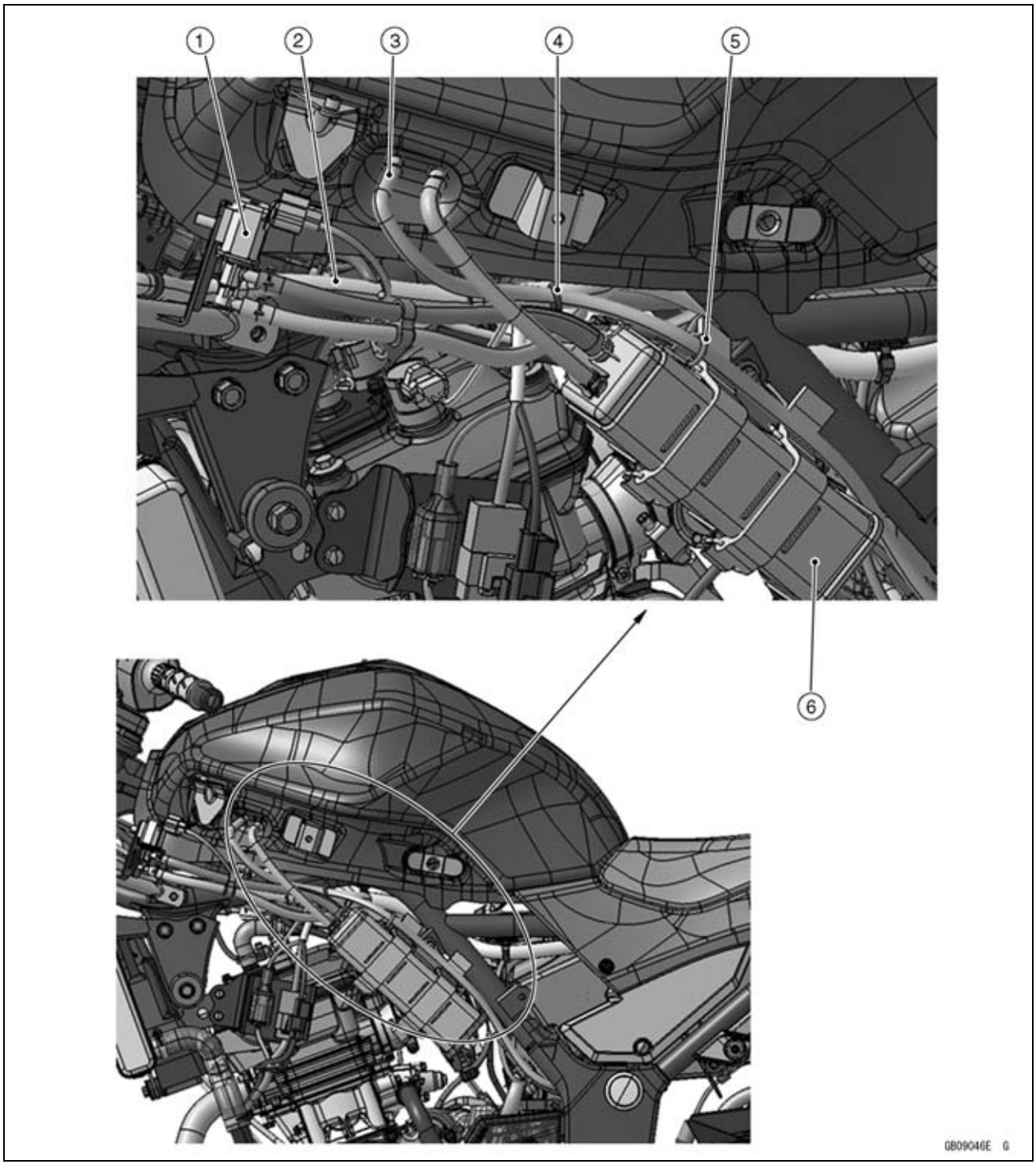
Cable, Wire, and Hose Routing



1. Stick Coil #1 Lead Connector
2. Stick Coil #2 Lead Connector

Cable, Wire, and Hose Routing

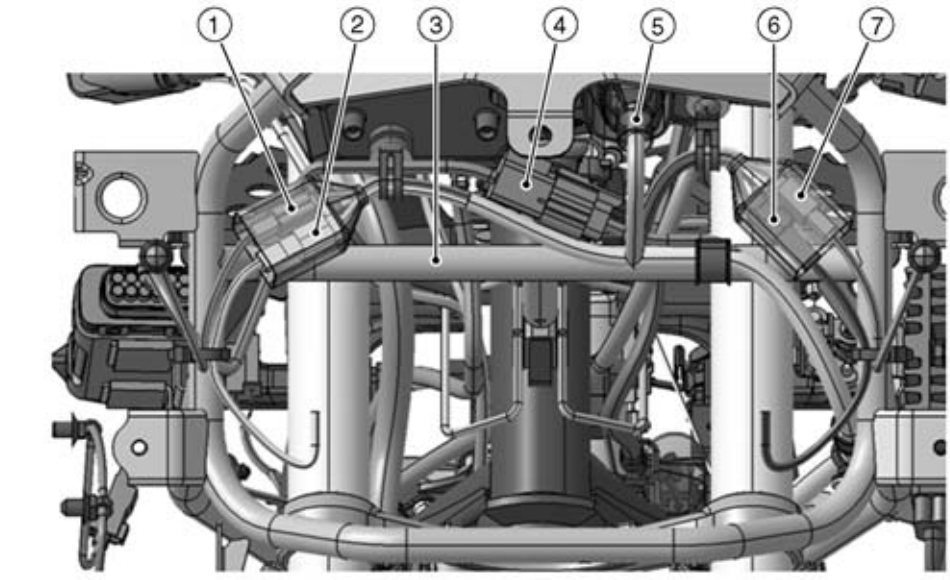
CAL Model

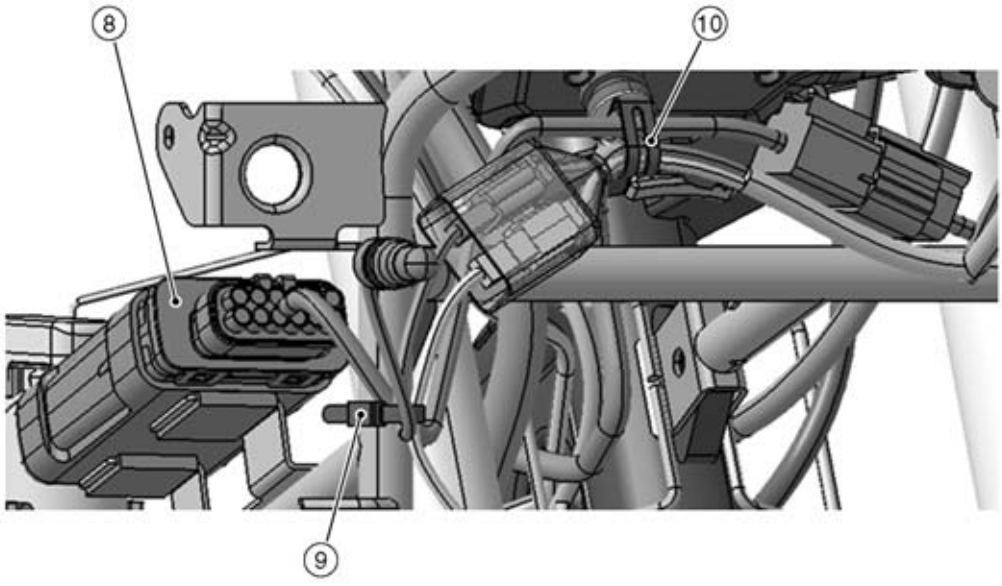


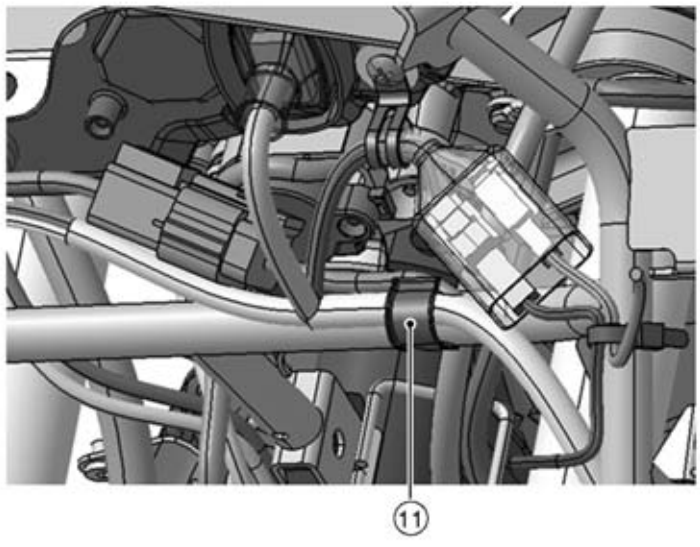
1. Purge Valve
2. Main Harness
3. Fuel Tank Drain Hose
4. Guide (Run the hose into the guide.)
5. Guide (Run the hose into the guide.)
6. Canister

Cable, Wire, and Hose Routing

GPS Unit Equipped Models







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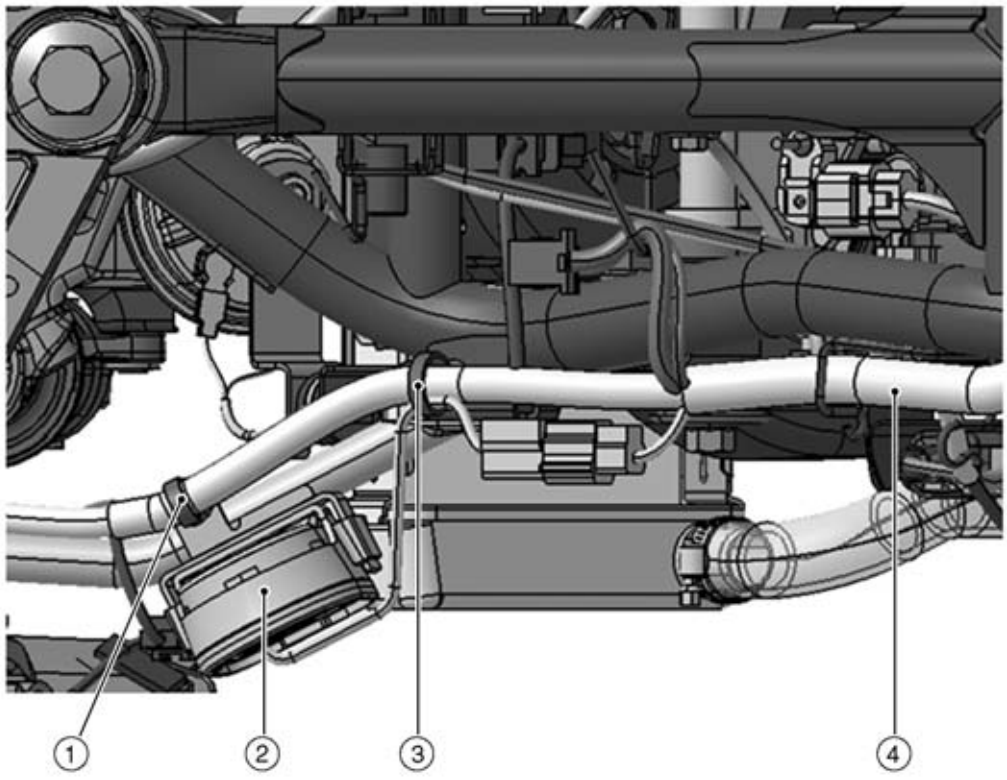
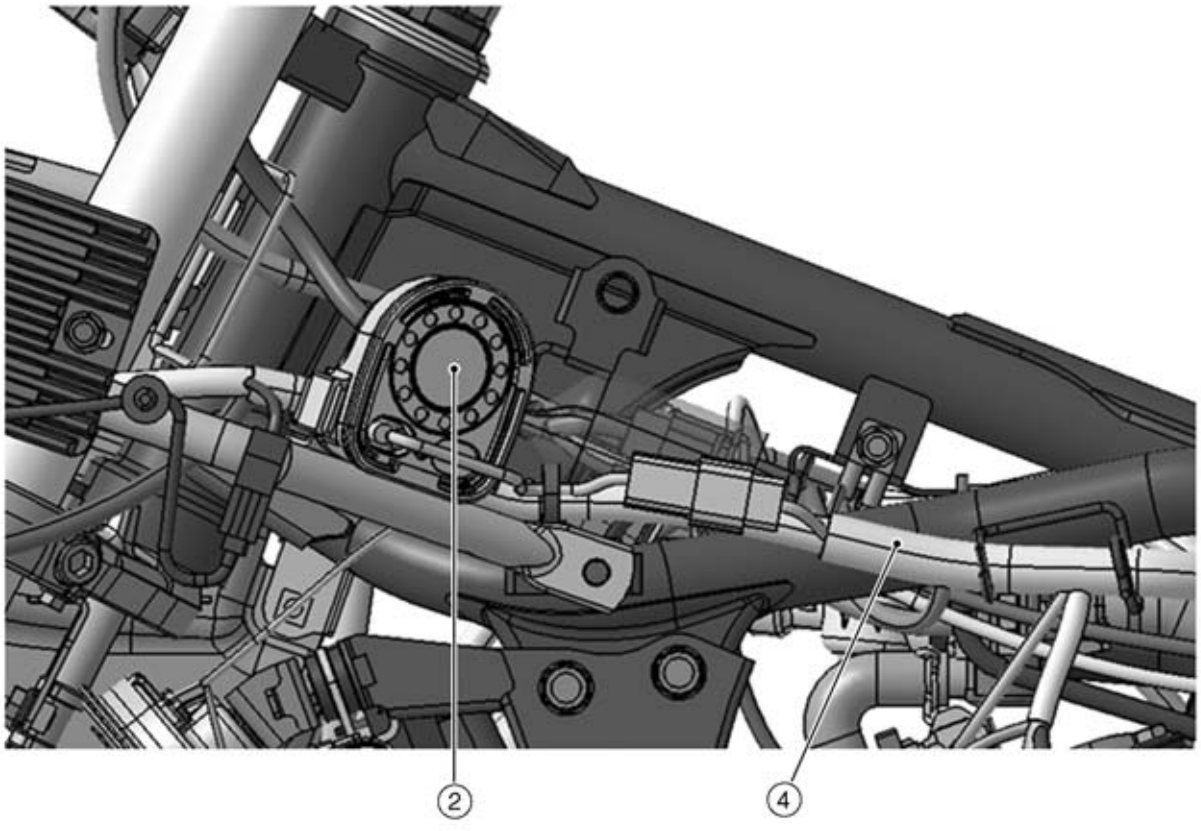
Cable, Wire, and Hose Routing

1. Right City Light Connector
2. Headlight (Low) Connector
3. Upper Fairing Bracket
4. GPS Unit Lead Connector
5. To Meter
6. Headlight (High) Connector
7. Left City Light Connector
8. GPS Unit
9. Band (Hold the right city light lead, headlight (low) lead and GPS unit lead to the upper fairing bracket.)
10. Clamp (Hold the main harness and GPS unit lead to the meter.)
11. Guide (Run the main harness and GPS unit lead to the upper fairing bracket.)

Cable, Wire, and Hose Routing

GPS Unit Equipped Models

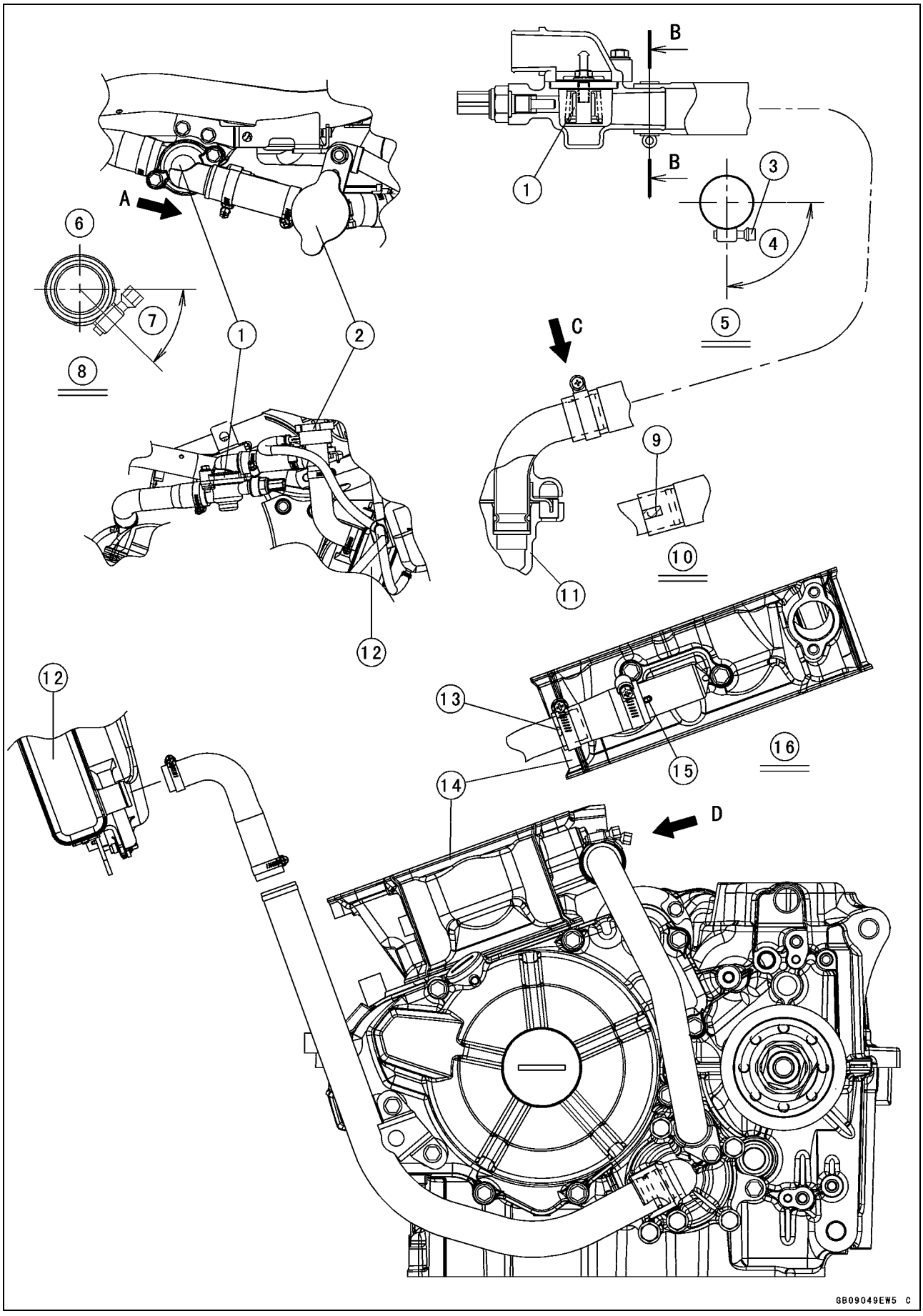




Cable, Wire, and Hose Routing

1. Band (Hold the main harness to the upper fairing bracket.)
2. Siren
3. Band (Hold the main harness to the frame.)
4. Main Harness

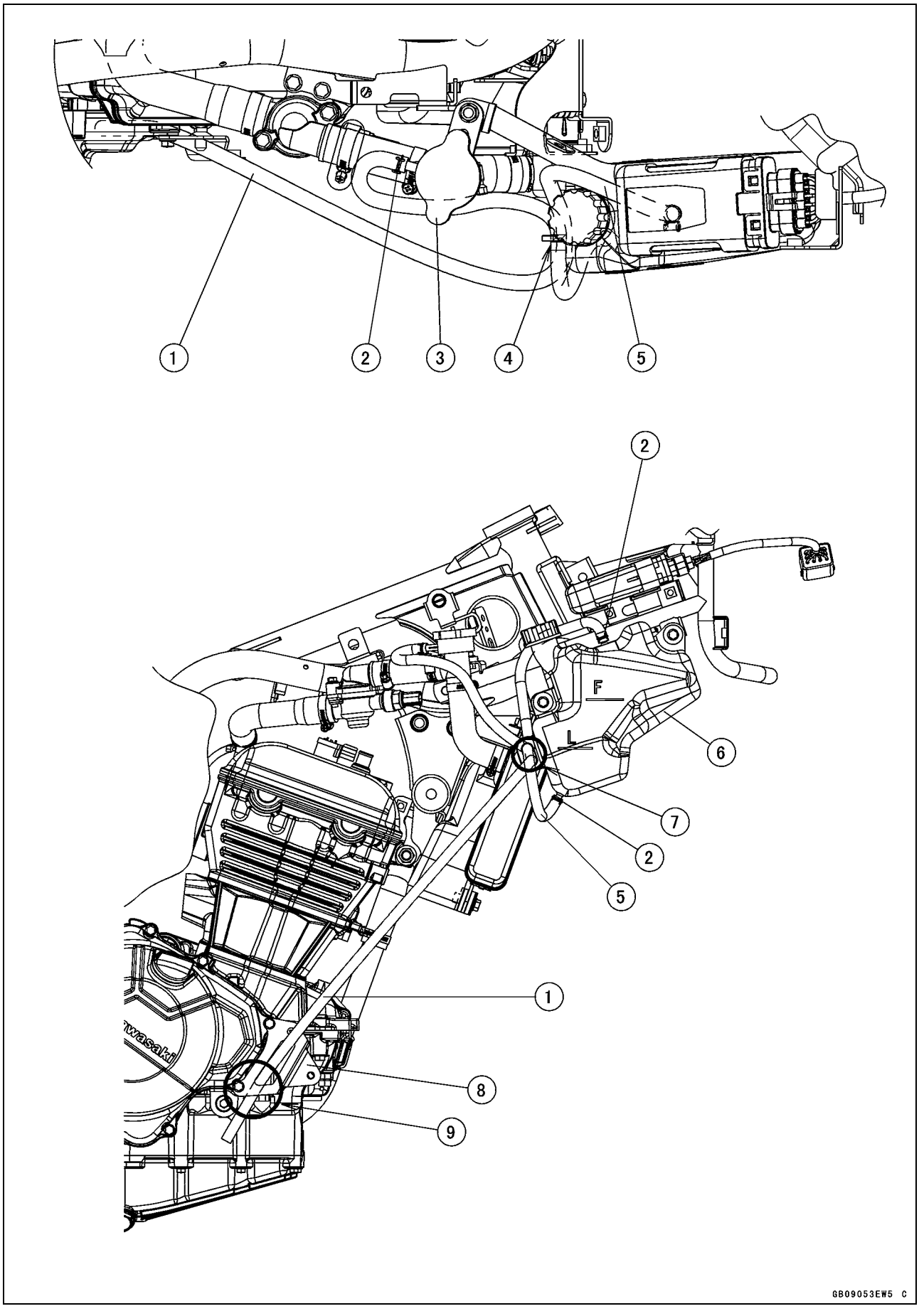
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Thermostat
2. Radiator Cap
3. Clamp Screw
4. 90°
5. Section B-B
6. Upper
7. 45°
8. Viewed A
9. Align the white paint mark on the hose with the projection mark on the fitting.
10. Viewed C
11. Cylinder Head
12. Radiator
13. Install the hose so that its end covers the white paint mark on the pipe.
14. Cylinder
15. Align the white paint mark on the hose with the projection mark on the fitting.
16. Viewed D

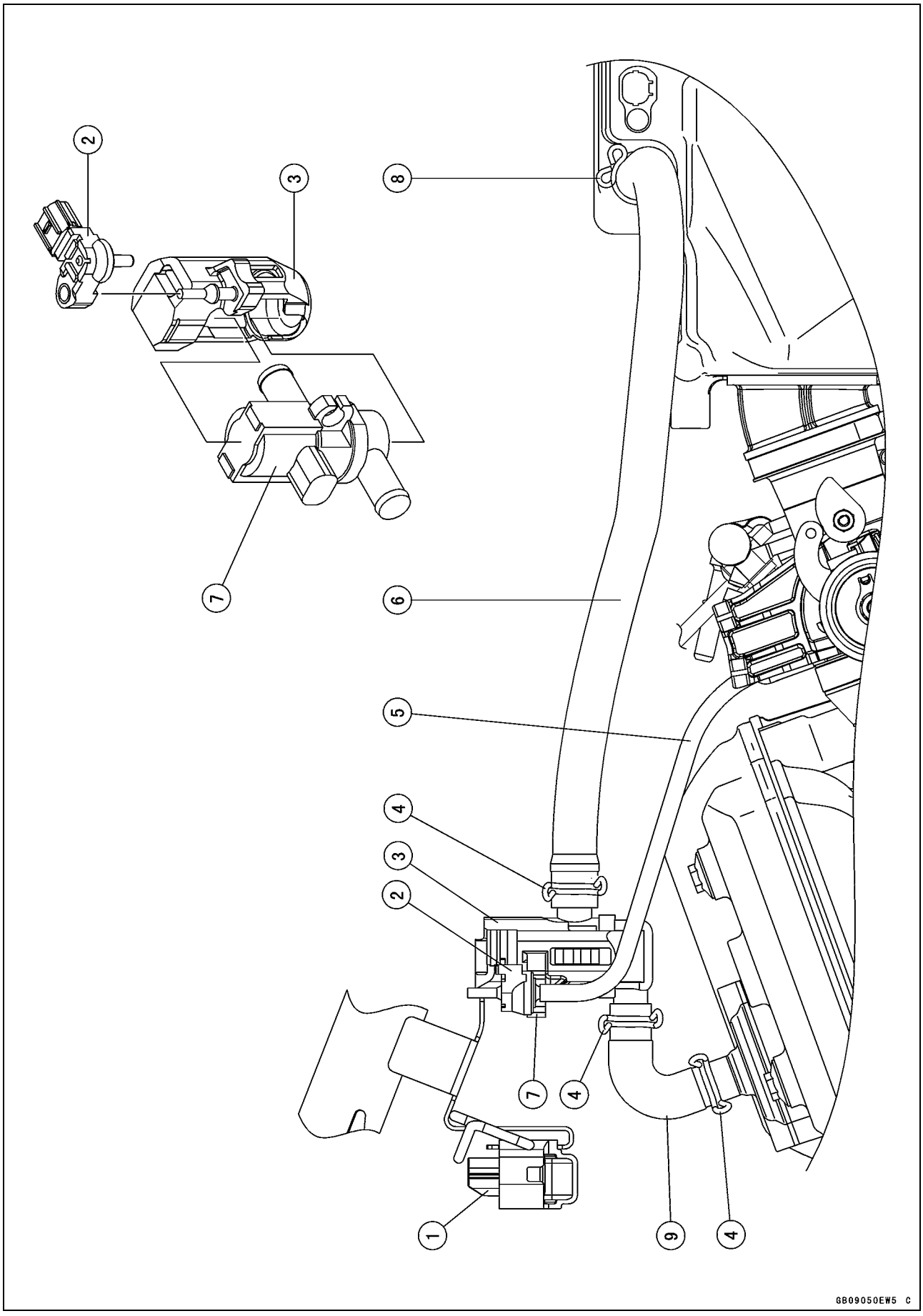
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Reserve Tank Overflow Hose
2. Clamps
3. Radiator Cap
4. Align the white paint mark on the hose with the hole of the reserve tank.
5. Reserve Tank Hose
6. Reserve Tank
7. Run the reserve tank overflow hose under the reserve tank hose.
8. Bracket
9. Run the reserve tank overflow hose into the bracket.

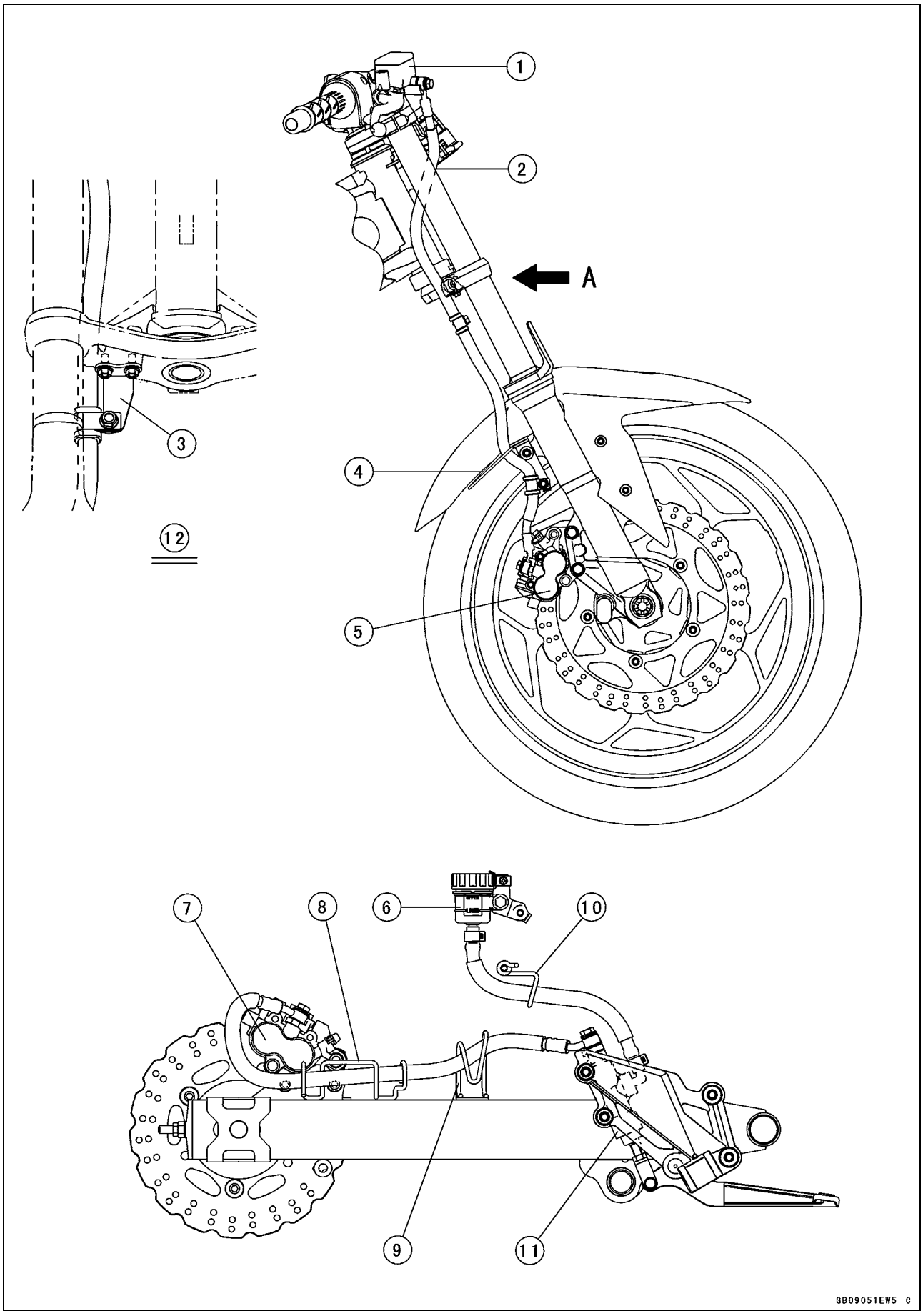
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Vehicle-down Sensor
2. Intake Air Pressure Sensor
3. Damper
4. Clamps
5. Vacuum Hose
6. Air Switching Valve Hose
7. Air Switching Valve
8. Clamp
9. Install the hose so that its white mark side faces the air switching valve.

Cable, Wire, and Hose Routing

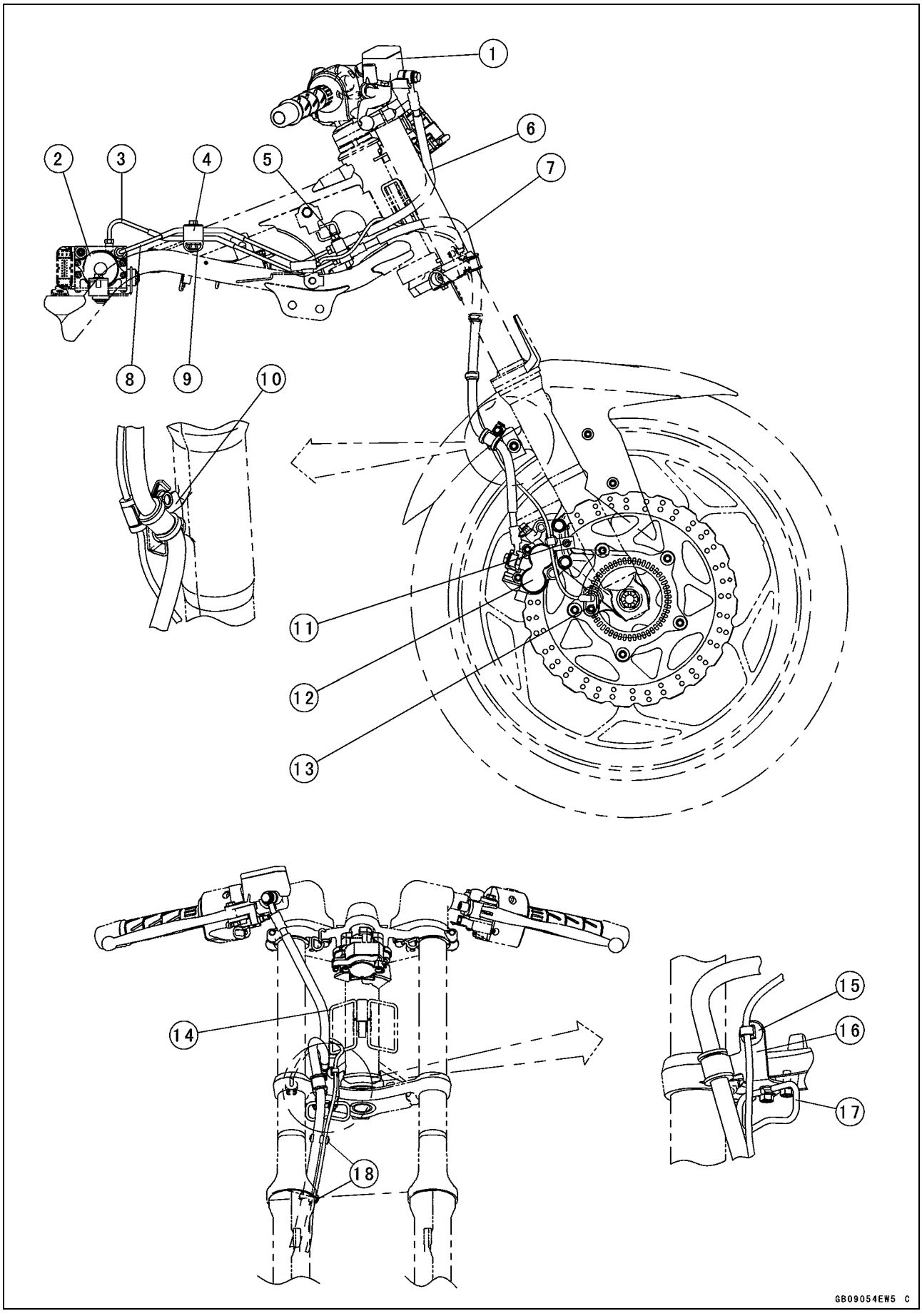


Cable, Wire, and Hose Routing

1. Front Master Cylinder
2. Front Brake Hose
3. Bracket
4. Guide
5. Front Brake Caliper
6. Rear Brake Reservoir Tank
7. Rear Brake Caliper
8. Clamp
9. Clamp
10. Clamp
11. Rear Master Cylinder
12. Viewed A

Cable, Wire, and Hose Routing

ABS Equipped Models

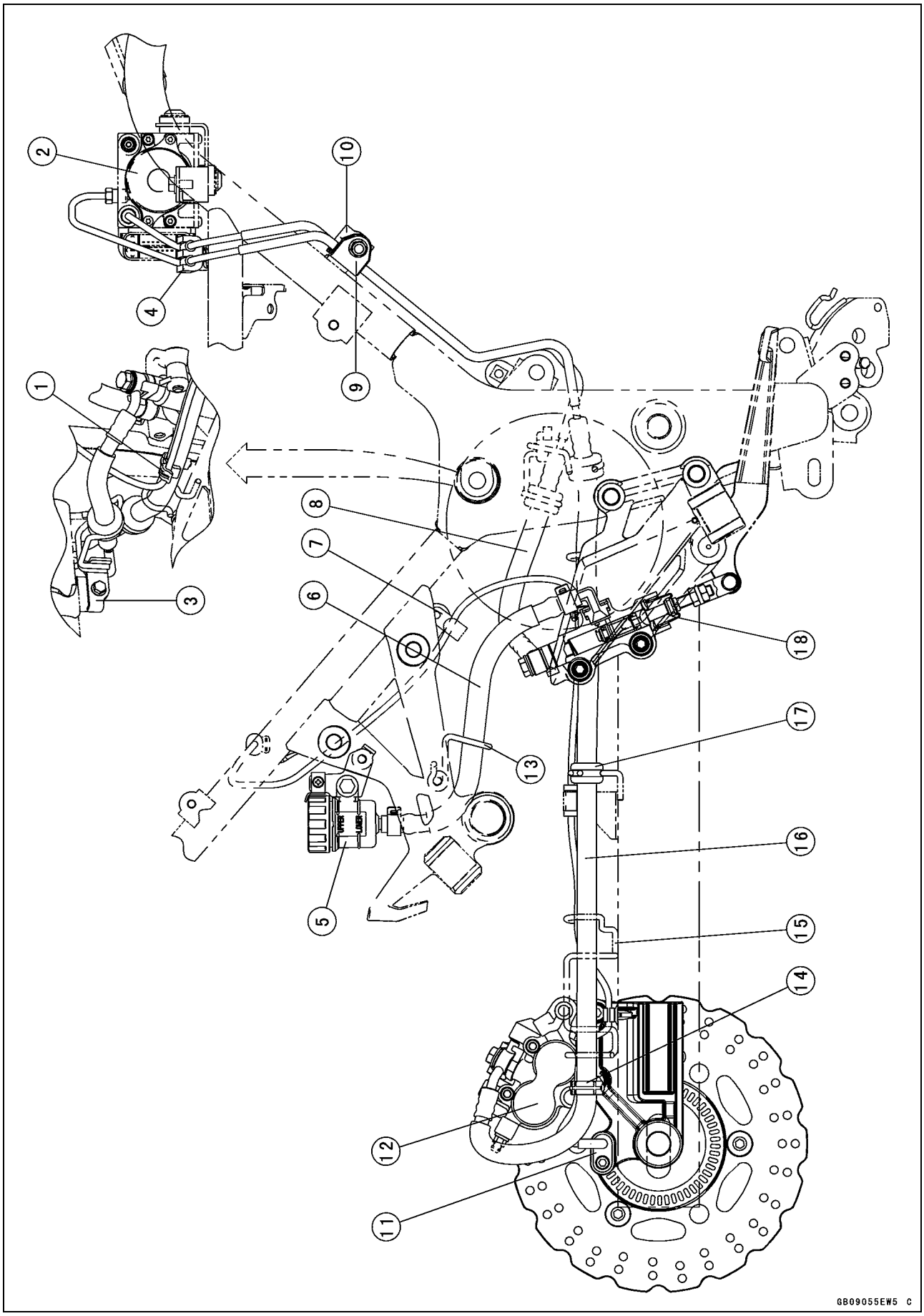


Cable, Wire, and Hose Routing

1. Front Master Cylinder
2. ABS Hydraulic Unit
3. Brake Pipe (ABS Hydraulic Unit ~ Front Caliper)
4. Clamp (Hold the brake pipes.)
5. Bracket (Hold the brake pipes.)
6. Brake Hose (Front Master Cylinder ~ ABS Hydraulic Unit)
7. Brake Hose (ABS Hydraulic Unit ~ Front Caliper)
8. Brake Pipe (Front Master Cylinder ~ ABS Hydraulic Unit)
9. Damper (Hold the brake pipes.)
10. Brake Hose Bracket
11. Clamp (Hold the front wheel rotation sensor lead.)
12. Front Brake Caliper
13. Front Wheel Rotation Sensor
14. Guide
15. Band
16. Bracket
17. Guide
18. Clamps (Hold the front wheel rotation sensor lead to the brake hose with the clamps at the white mark on the lead.)

Cable, Wire, and Hose Routing

ABS Equipped Models

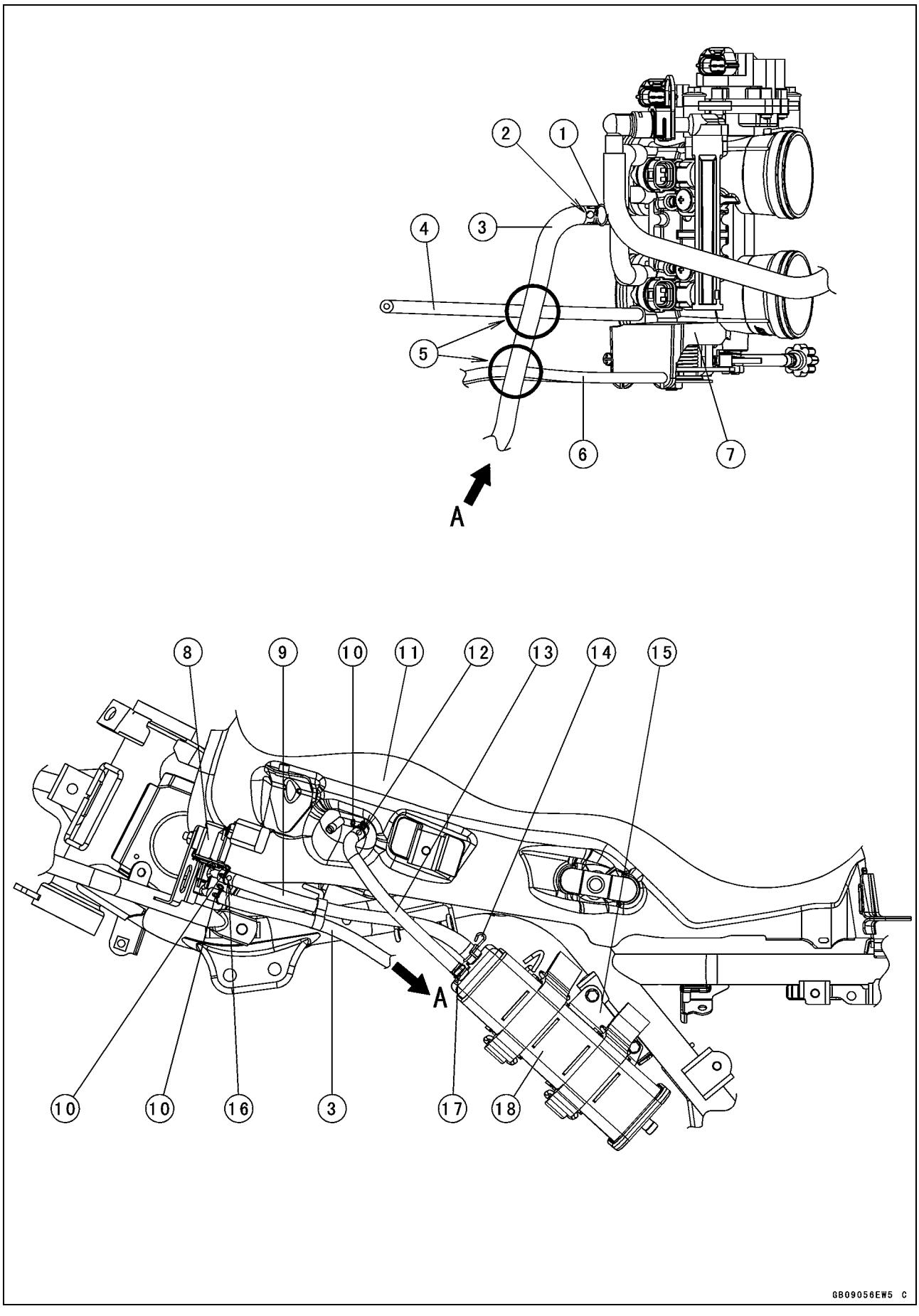


Cable, Wire, and Hose Routing

1. Clamp (Hold the rear wheel rotation sensor lead to the brake hose with the clamp at the white mark on the lead.)
2. ABS Hydraulic Unit
3. Bracket (Hold the brake hoses.)
4. Clamp (Hold the brake pipes.)
5. Rear Brake Reservoir Tank
6. Brake Hose (Rear Brake Reservoir Tank ~ Rear Master Cylinder)
7. Clamp (Hold the rear wheel rotation sensor lead.)
8. Brake Hose (Rear Master Cylinder ~ ABS Hydraulic Unit)
9. Clamp (Hold the brake pipes.)
10. Damper (Hold the brake pipes.)
11. Rear Wheel Rotation Sensor
12. Rear Brake Caliper
13. Clamp (Hold the brake hose.)
14. Clamp (Hold the brake hose.)
15. Guide (Run the rear wheel rotation sensor lead)
16. Brake Hose (ABS Hydraulic Unit ~ Rear Caliper)
17. Clamp (Hold the brake hose.)
18. Rear Master Cylinder

Cable, Wire, and Hose Routing

CAL Model



Cable, Wire, and Hose Routing

1. Clamp (Face the tabs of the clamp in direction.)
2. Green Mark
3. Hose (Green)
4. Vacuum Hose
5. Run the hose (Green) over the vacuum hose and throttle cable.
6. Throttle Cable
7. Throttle Body Assy
8. Purge Valve
9. Hose (Green)
10. Clamps (Hold the hoses.)
11. Fuel Tank
12. Blue Mark
13. Hose (Blue)
14. Clamp (Hold the hose.)
15. Bracket
16. Green Mark
17. Clamp (Hold the hose.)
18. Canister

Troubleshooting Guide

NOTE

○*Refer to the Fuel System (DFI) chapter for most of DFI trouble shooting guide.*

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Starter lockout switch or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:
- Starter clutch trouble
- Vehicle-down sensor (DFI) coming off

Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure

No fuel flow:
- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

Engine flooded:
- Clean spark plug and adjust plug gap
- Starting technique faulty
- (When flooded, do not crank the engine with the throttle fully opened. This promotes engine flood because more fuel is supplied automatically by DFI.)

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Ignition switch not ON
- Engine stop switch turned to stop position
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Spark plug dirty, broken, or gap maladjusted
- Stick coil shorted or not in good contact
- Stick coil trouble
- Spark plug incorrect
- IC igniter in ECU trouble
- Neutral, starter lockout, or side stand switch trouble
- Crankshaft sensor trouble
- Ignition switch or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Fuel/air mixture incorrect:
- Bypass screw and/or idle adjusting screw maladjusted
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing

Compression Low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Stick coil wiring trouble
- Stick coil not in good contact
- Spark plug incorrect
- IC igniter in ECU trouble
- Crankshaft sensor trouble
- Stick coil trouble

Fuel/air mixture incorrect:
- Bypass screw maladjusted
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Throttle body assy holder loose
- Air cleaner duct loose

Compression low:
- Spark plug loose

Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head warped
Cylinder head gasket damaged
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Other:
IC igniter in ECU trouble
Throttle body assy not synchronizing
Engine oil viscosity too high
Drive train trouble
Brake dragging
Air suction valve trouble
Air switching valve trouble
Engine overheating
Clutch slipping

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Stick coil wiring trouble
Stick coil not in good contact
Spark plug incorrect
Camshaft position trouble
IC igniter in ECU trouble
Crankshaft sensor trouble
Stick coil trouble

Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Air cleaner O-ring damaged
Air cleaner duct loose
Water or foreign matter in fuel
Throttle body assy holder loose
Fuel to injector insufficient (DFI)
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble

Compression low:
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
IC igniter in ECU trouble
Crankshaft sensor trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Air suction valve trouble
Air switching valve trouble
Catalytic converter melt down due to muffler overheating (KLEEN)

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
IC igniter in ECU trouble

Muffler overheating:
For KLEEN, do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
For KLEEN, do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
For KLEEN, do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
For KLEEN, do not coast the motorcycle with the ignition switch off (Turn the ignition switch ON and run the engine)
IC igniter in ECU trouble

Fuel/air mixture incorrect:
Throttle body assy holder loose
Air cleaner duct loose
Air cleaner poorly sealed, or missing
Air cleaner O-ring damaged
Air cleaner clogged

Compression high:
Carbon built up in combustion chamber

Engine load faulty:
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble

Brake dragging
Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect
Water temperature warning indicator light incorrect:
Meter unit trouble
Water temperature sensor broken
Coolant incorrect:
Coolant level too low
Coolant deteriorated
Wrong coolant mixed ratio
Cooling system component incorrect:
Radiator fin damaged
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Cooling system component incorrect:
Radiator fan relay trouble
Thermostat trouble
Water temperature sensor broken

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch hub or housing unevenly worn
No clutch lever play
Clutch inner cable trouble
Clutch release mechanism trouble
Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring compression uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch hub nut loose
Clutch hub spline damaged
Clutch friction plate installed wrong
Clutch lever play excessive
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Gear positioning lever binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Shift pawl broken
Jumps out of gear:
Shift fork ear worn, bent
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Gear positioning lever spring weak or broken
Shift fork guide pin worn
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Gear positioning lever spring weak or broken
Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:
IC igniter in ECU trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating
Piston slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston pin hole worn
Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Valve lifter worn
Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring/groove clearance excessive
Piston ring worn, broken, or stuck
Piston ring groove worn
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mount loose
Crankshaft bearing worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged

Troubleshooting Guide

Air switching valve damaged
Alternator rotor loose
Catalytic converter melt down due to muffler overheating (KLEEN)

Abnormal Drive Train Noise:

Clutch noise:
Clutch housing/friction plate clearance excessive
Clutch housing gear worn
Wrong installation of outside friction plate

Transmission noise:
Bearings worn
Transmission gear worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

Drive line noise:
Drive chain adjusted improperly
Drive chain worn
Rear and/or engine sprocket worn
Chain lubrication insufficient
Rear wheel misaligned

Abnormal Frame Noise:

Front fork noise:
Oil insufficient or too thin
Spring weak or broken

Rear shock absorber noise:
Shock absorber damaged

Disc brake noise:
Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble

Other noise:
Bracket, nut, bolt, etc. not properly mounted or tightened

Oil Pressure Warning Light Goes On:

Engine oil pump damaged
Engine oil screen clogged
Engine oil filter clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearing worn
Crankshaft bearing worn
Oil pressure switch damaged
Wiring faulty
Relief valve stuck open
O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

Black smoke:
Air cleaner clogged

Brown smoke:
Air cleaner duct loose
Air cleaner O-ring damaged
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebar hard to turn:
Cable routing incorrect
Hose routing incorrect
Wiring routing incorrect
Steering stem nut too tight
Steering stem bearing damaged
Steering stem bearing lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates:
Tire worn
Swingarm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar holder bolt loose
Steering stem nut loose
Front, rear axle runout excessive
Engine mounting bolt loose

Handlebar pulls to one side:
Frame bent
Wheel misalignment
Swingarm bent or twisted
Swingarm pivot shaft runout excessive
Steering maladjusted
Front fork bent
Right and left front fork oil level uneven

Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Rear shock absorber adjustment too hard
Tire air pressure too high
Front fork bent
(Too soft)
Tire air pressure too low
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Rear shock adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

Brake Doesn't Hold:

Air in the brake line
Pad or disc worn

Troubleshooting Guide

Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder scratched inside

Battery Trouble:

Battery discharged:
Charge insufficient
Battery faulty (too low terminal voltage)
Battery cable making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/rectifier trouble

Battery overcharged:
Alternator trouble
Regulator/rectifier trouble
Battery faulty

MODEL APPLICATION

Year	Model	Beginning Frame No.
2013	EX300AD	JKAEX8A1□DDA00001 JKAEX300AADA00001
2013	EX300BD	JKAEX8B1□DDA00001 JKAEX300ABDA00001

□:This digit in the frame number changes from one machine to another.

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